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SUBJECT: Transmittal Of the Remedial Investigation & Feasibility Study Work Plan for the Sitewide Waste Disposal Disposition

TO: Maria Galanti **FROM: Joel Bradburne**

SOURCE REF: PPPO-03-1306740-11 **RMDC NUMBER:** FBP11/001-140

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OCT 05 2011

PPPO-03-1306740-11

Ms. Maria Galanti
Site Coordinator
Ohio Environmental Protection Agency
Southeast District Office
2195 Front Street
Logan, Ohio 43138

Dear Ms. Galanti:

TRANSMITTAL OF THE REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORK PLAN FOR THE SITEWIDE WASTE DISPOSITION EVALUATION PROJECT AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT, PIKETON, OHIO

Enclosed for your review, please find the U.S. Department of Energy (DOE) transmittal of the *Remedial Investigation and Feasibility Study Work Plan for the Sitewide Waste Disposition Evaluation Project at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE/PPPO/03-0133&D2). This document was prepared in accordance with the *Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project)*. Also enclosed is the response to comments received August 1, 2011 from the Ohio Environmental Protection Agency (EPA) on the D1 version of the document.

DOE also acknowledges and appreciates the extensive informal discussions Ohio EPA has participated in with the Department to accelerate the development of this document. Moreover, DOE has worked to respond to additional informal comments received from Ohio EPA, some as recently as September 29. Please note, due to time constraints, not all of Ohio EPA's informal comments were addressed and some may require further discussion with you for resolution. As we have discussed and as noted in the work plan, the discussion on applicable or relevant and appropriate requirements is presented as draft in Appendix B to indicate DOE and Ohio EPA are continuing to work together to finalize these requirements.

If you have any questions or require additional information, please contact Kristi Wiehle of my staff at (740) 897-5020.

Sincerely,

Joel B. Bradburne
Portsmouth Site Lead
Portsmouth/Paducah Project Office

Enclosures:
1) D2 Remedial Investigation and Feasibility Study Work Plan for the Sitewide Waste Disposition Evaluation Project at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio
2) Response to Ohio EPA comments received August 1, 2011

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REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORK PLAN FOR THE SITEWIDE WASTE DISPOSITION EVALUATION PROJECT AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT, PIKETON, OHIO

U.S. Department of Energy
DOE/PPPO/03-0133&D2

October 2011

by:
FBP LLC, a Joint Venture Under Contract DE-AC30-10CC40017

FBP-ER-RIFS-WD-PLN-0014, Revision 3

This document has been approved for public release:

Henry Thomas (signature on file) 6-6-2011
Classification & Information Officer Date

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REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORK PLAN FOR THE SITEWIDE WASTE DISPOSITION EVALUATION PROJECT AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT, PIKETON, OHIO

U.S. Department of Energy
DOE/PPPO/03-0133&D2

October 2011

Prepared for
U.S. Department of Energy
Portsmouth/Paducah Project Office

Prepared by
FBP LLC, a Joint Venture Under Contract DE-AC30-10CC40017

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ACRONYMS

AEA	Atomic Energy Act of 1954
ARAR	applicable or relevant and appropriate requirements
CD	Critical Decision
CEC	cation exchange capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	*Code of Federal Regulations*
COPC	contaminant of potential concern
CPT	cone penetrometer testing
CRP	Community Relations Plan
CSM	conceptual site model
CWA	Clean Water Act of 1972
D&D	decontamination and decommissioning
DFF&O	*Director's Final Findings and Orders – Modification of April 13, 2010, Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project)*
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DQO	data quality objective
ELCR	excess life-time cancer risk
EPA	U.S. Environmental Protection Agency
FBP	Flour-B&W Portsmouth, LLC
FS	Feasibility Study
H&S	health and safety
HASP	Health and Safety Plan
HI	hazard index
LDR	land disposal restriction
LEU	low-enriched uranium
LLW	low-level (radioactive) waste
LMES	Lockheed Martin Energy Systems, Inc.
MLLW	mixed low-level waste
NDA	nondestructive assay
NEPA	National Environmental Policy Act of 1969
NNSS	Nevada National Security Site
NPDES	National Pollutant Discharge Elimination System
OAC	*Ohio Administrative Code*
Ohio EPA	Ohio Environmental Protection Agency
RC	*Ohio Revised Code*
OSDC	on-site disposal cell
PCB	polychlorinated biphenyl
PER	Pre-investigation Evaluation Report
PM	project manager
PORTS	Portsmouth Gaseous Diffusion Plant
PP	Proposed Plan
PRG	preliminary remediation goal
QA	quality assurance
QAPP	Quality Assurance Project Plan

RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act of 1976
RI	Remedial Investigation
ROD	Record of Decision
SAP	Sampling and Analysis Plan
TBC	to be considered
TCE	trichloroethene
TOC	total organic carbon
TPMC	Theta Pro2Serve Management Company, LLC
TSCA	Toxic Substances Control Act of 1976
USC	*United States Code*
USEC	United States Enrichment Corporation
WAC	waste acceptance criteria

EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) is responsible for decontamination and decommissioning (D&D) and cleanup of the Portsmouth Gaseous Diffusion Plant (PORTS). The Ohio Environmental Protection Agency (Ohio EPA) and DOE have reached a mutual agreement on how to address D&D activities at PORTS. This agreement has been documented in the *Director's Final Findings and Orders – Modification of April 13, 2010, Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project)* (DFF&O) (Ohio EPA 2011). The existing Resource Conservation and Recovery Act of 1976 (RCRA) Consent Decree, signed in August 1989 by Ohio EPA and DOE, requires DOE to complete site investigations to determine the nature and extent of environmental contamination that exists at PORTS, complete cleanup alternative studies, and implement corrective actions as needed. Any environmental media cleanup activities at PORTS will be completed pursuant to both this RCRA Consent Decree and, as applicable, a RCRA/Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Administrative Consent Order signed June 1997.

This Sitewide Waste Disposition Evaluation project evaluates an integrated waste management decision for PORTS. The volume of anticipated D&D material is currently estimated at 1.6 million cy. The current estimate for the volume of RCRA corrective action environmental media waste that might be disposed is 600,000 cy based on process knowledge, past studies, and engineering judgment. Therefore, the baseline estimate of total waste volume potentially requiring disposition is 2.2 million cy (1.6 million cy plus 600,000 cy).

A Pre-investigation Evaluation Report (PER) for the Sitewide Waste Disposition Evaluation project (DOE 2010a) was prepared in accordance with the DFF&O. Information contained in that document was discussed in a series of technical scoping meetings with the Ohio EPA. The purpose of the scoping meetings was to lay the groundwork for the Remedial Investigation/Feasibility Study (RI/FS) process and, specifically, to facilitate the development of this RI/FS Work Plan. The preliminary remedial alternatives to be evaluated include the following:

- The *No Action Alternative*, For the purpose of this evaluation, this alternative assumes no D&D and therefore no waste disposal.

- The *On-site Alternative*, which includes disposal of the projected volume of anticipated D&D waste in an on-site engineered disposal facility designed, constructed, and operated to accept low-level (radioactive) waste (LLW), hazardous waste, Toxic Substances and Control Act of 1976 (TSCA) waste, mixed waste (combinations of LLW, hazardous waste, and/or TSCA waste), and noncontaminated solid waste. Such a facility would only handle PORTS-generated waste that meets the Ohio EPA-approved waste acceptance criteria (WAC). Waste that does not meet the on-site WAC would be disposed at an off-site facility. Because of the ability to request authorizations and exemptions under Ohio regulations to dispose of RCRA corrective action waste in a potential on-site disposal facility (OSDC), this alternatives analysis includes consideration of the potential volume of waste that is anticipated to be generated during RCRA corrective actions at PORTS. Consent Decree/Administrative Consent Order waste cannot be disposed of in an OSDC without DOE obtaining the appropriate authorization and/or exemptions from Ohio EPA and such waste would have to meet the Ohio EPA approved WAC.

- The *Off-site Alternative*, which includes disposal of the projected volume of all anticipated D&D waste in an approved off-site disposal facility or a combination of off-site disposal facilities capable of accepting LLW, hazardous waste, TSCA waste, mixed waste (combinations of LLW, hazardous waste, and/or TSCA waste), and noncontaminated solid waste.

This RI/FS Work Plan describes how the Sitewide Waste Disposition Evaluation project RI/FS will be implemented, summarizes the data availability and data gaps, and identifies how the data gaps will be addressed. This work plan also includes a preliminary site selection screening for a potential on-site disposal cell, a listing of applicable or relevant and appropriate requirements, and a preliminary analytic WAC for use in the FS evaluation. Data were identified, as needed, to support development of the WAC, support determination of the optimum location for a potential waste disposal facility, and refine the volumes of waste that may meet the on-site WAC.

Cleanup progress at PORTS is made possible, in part, by the active and informed participation of site stakeholders, including regulators, workers, elected officials, and members of the public. Public participation and information exchange are key components of the DFF&O process, and this RI/FS Work Plan describes the process for formal and informal stakeholder participation in the waste disposition evaluation.

1. INTRODUCTION AND PROJECT BACKGROUND

The Portsmouth Gaseous Diffusion Plant (PORTS), which began operations in 1954, is located on a 3,777-acre Federal reservation in a rural area of Pike County, Ohio (Figure 1). From 1954 until 2001, the PORTS gaseous diffusion process enriched uranium for the U.S. Department of Energy (DOE) and predecessor agencies, the Naval Nuclear Propulsion Program, and commercial customers. In 1993, DOE began leasing the uranium enrichment production and operations facilities at PORTS to the United States Enrichment Corporation (USEC). Uranium was enriched at the site by USEC until May 2001, at which time the production facilities were placed into a cold standby mode. During cold standby, the process buildings were maintained with a restart capability as a strategic hedge against a disruption in the nation's supply of enriched uranium. DOE terminated the cold standby program in September 2005 and replaced it with a cold shutdown program, which no longer maintains the gaseous diffusion restart capability. The PORTS site is owned by DOE, and the uranium enrichment facilities are in the process of being transitioned back to DOE from USEC.

The Ohio Environmental Protection Agency (Ohio EPA) and DOE have reached mutual agreement on how to address decontamination and decommissioning (D&D) activities at PORTS. This agreement is documented in the *Director's Final Findings and Orders – Modification of April 13, 2010, Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project)* (DFF&O) (Ohio EPA 2011), which went into effect April 13, 2010.

This Sitewide Waste Disposition Evaluation project includes the evaluation of an integrated waste management decision for PORTS. The proposed scope of the decision for the Sitewide Waste Disposition Evaluation Remedial Investigation/Feasibility Study (RI/FS) and associated Record of Decision (ROD) includes the following:

- Disposition of waste generated by any planned D&D activities, including the development of alternatives and criteria for possible on-site disposal

- Opportunity to reuse or recycle any material generated during demolition of the buildings with all disposal alternatives as well as potential siting, construction, operating, and D&D of the facilities to decontaminate, treat, size reduce, and/or package such materials.

The scope of the decision for the Sitewide Waste Disposition Evaluation RI/FS and associated ROD does not include the following:

- Determination of reuse or demolition of any manmade structures at PORTS

- Decision on remediation of environmental media impacted by site contamination not required to be removed to construct an on-site disposal cell (OSDC) (if selected).

According to Attachment A Section 3.5.1 of the DFF&O, the Sitewide Waste Disposition Evaluation project will include potential waste streams associated with environmental media cleanup activities to be conducted under the Resource Conservation and Recovery Act of 1976 (RCRA) Consent Decree and for which DOE might seek exemptions under Ohio laws and regulations to allow placement of such waste streams in any OSDC.

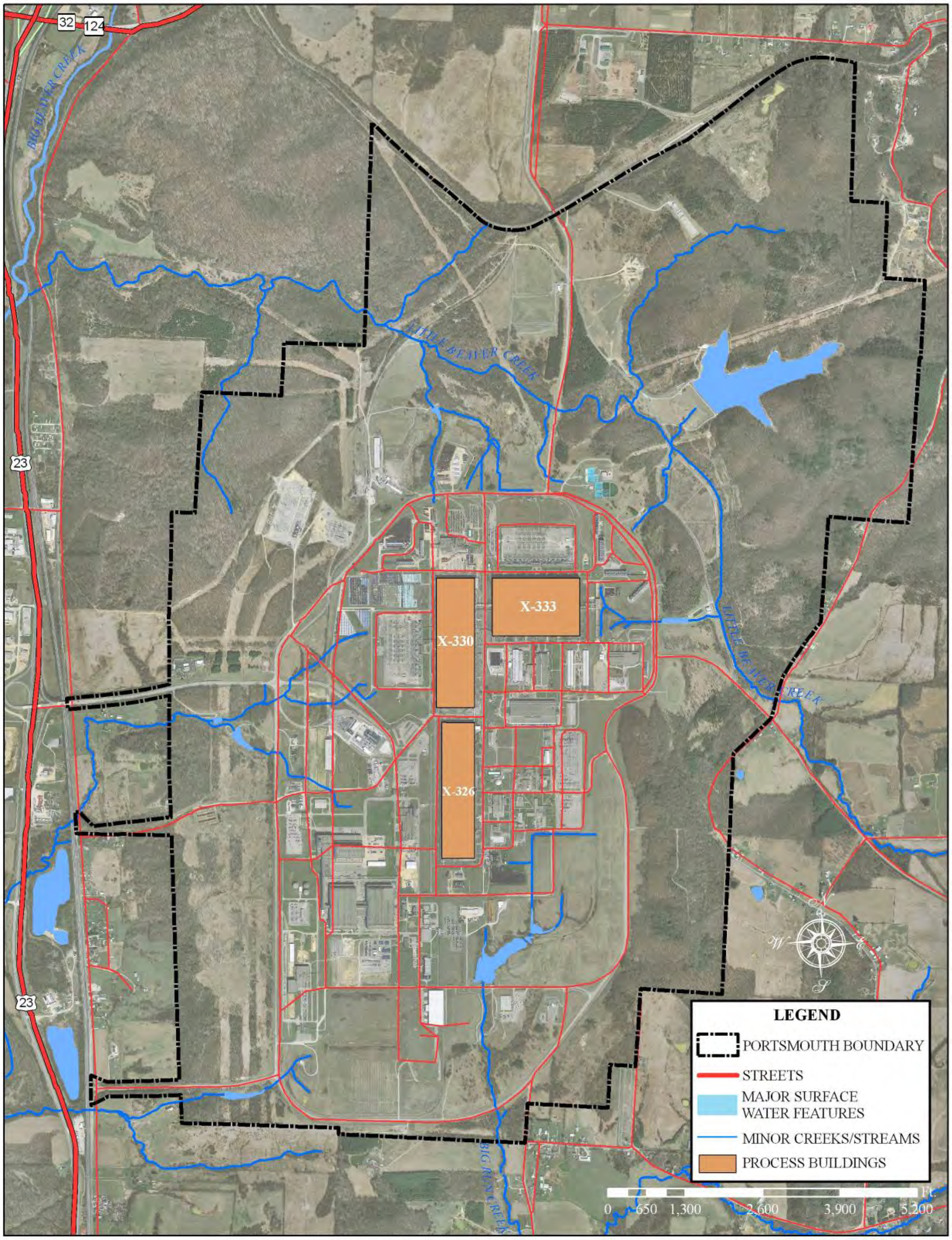

Figure 1. PORTS Facility

A Pre-investigation Evaluation Report (PER) was prepared and submitted to the Ohio EPA in October 2010 (DOE 2010a). Information contained in that document was discussed in a series of project scoping meetings and technical discussions between DOE and Ohio EPA. The purpose of the PER was to identify the approach to be used in the Sitewide Waste Disposition Evaluation RI/FS, document the performance and results of the RI/FS scoping tasks, and establish a framework for later development of this Sitewide Waste Disposition Evaluation RI/FS Work Plan. Comments received from Ohio EPA on the PER are either addressed in this work plan or will be addressed in the forthcoming RI/FS report.

The following sections provide a summary of the site history and describe the gaseous diffusion process at PORTS. In addition, the current site conditions and physical setting of the site relative to location, meteorology, geology, hydrology, and ecological resources are discussed.

1.1 SITE HISTORY AND CONTAMINANTS

This section presents a summary of the current physical setting and site conditions relative to location, geology, hydrology, and site contamination at PORTS. The PER includes a more extensive discussion of the site conditions, which will be reiterated in the RI/FS report. This information helps form the foundation of the conceptual site model (CSM) for the PORTS site.

The PORTS site is located on a 3,777-acre parcel of land in Pike County, Ohio. The gaseous diffusion plant and surrounding site are owned and operated by DOE. PORTS began operations in 1954 and is one of three uranium enrichment facilities originally constructed in the United States; the other two were constructed in Oak Ridge, Tennessee, and Paducah, Kentucky. PORTS used the gaseous diffusion process to provide highly enriched uranium to the U.S. Navy and low-enriched uranium (LEU) for electrical power generation. From 1991 until production ceased in 2001, PORTS produced only LEU for commercial power plants. In 1993, DOE leased the uranium enrichment operations to USEC while retaining responsibility for certain environmental restoration and waste management activities, uranium programs, and long-term stewardship of nonleased facilities at PORTS. In August 2000, USEC made a business decision to terminate enrichment operations at PORTS, and ceased those activities in May 2001.

The PORTS site is situated in south central Ohio, east of the Scioto River, and within the Scioto River drainage basin (Figure 2). It occupies an upland area of southern Ohio and has an average land surface elevation of 670 ft above mean sea level. The plant site sits in a 1-mile-wide abandoned river valley situated approximately 130 ft above the Scioto River floodplain, which lies to the west. In much of the industrialized area of PORTS, the original topography has been modified and graded for the construction of buildings and other facility components. Much of the industrialized area of PORTS is located on fill that was removed from higher elevations of the plant site and placed in existing drainage valleys and depressions. The local topography is dominated by ancient and recent streams. The predominant landform in the site area is an undulating, broad, sediment-filled, ancient river valley. This valley is oriented north-south and is bounded on the east and west by deeply dissected ridges and low-lying hills.

The subsurface in the PORTS area consists of approximately 30-40 ft of unconsolidated Quaternary clastic sediments unconformably overlying Paleozoic bedrock that dips gently toward the east (Figure 3). In stratigraphic order, bedrock is overlain by fluvial Gallia sand and gravel (Gallia) and by the lacustrine Minford clay and silt (Minford) of the Teays Formation. The erosion and subsequent fill of the Portsmouth River Valley during the Pleistocene is a primary factor controlling the shallow geologic units beneath PORTS. The groundwater flow system includes the water-bearing units of Berea sandstone and

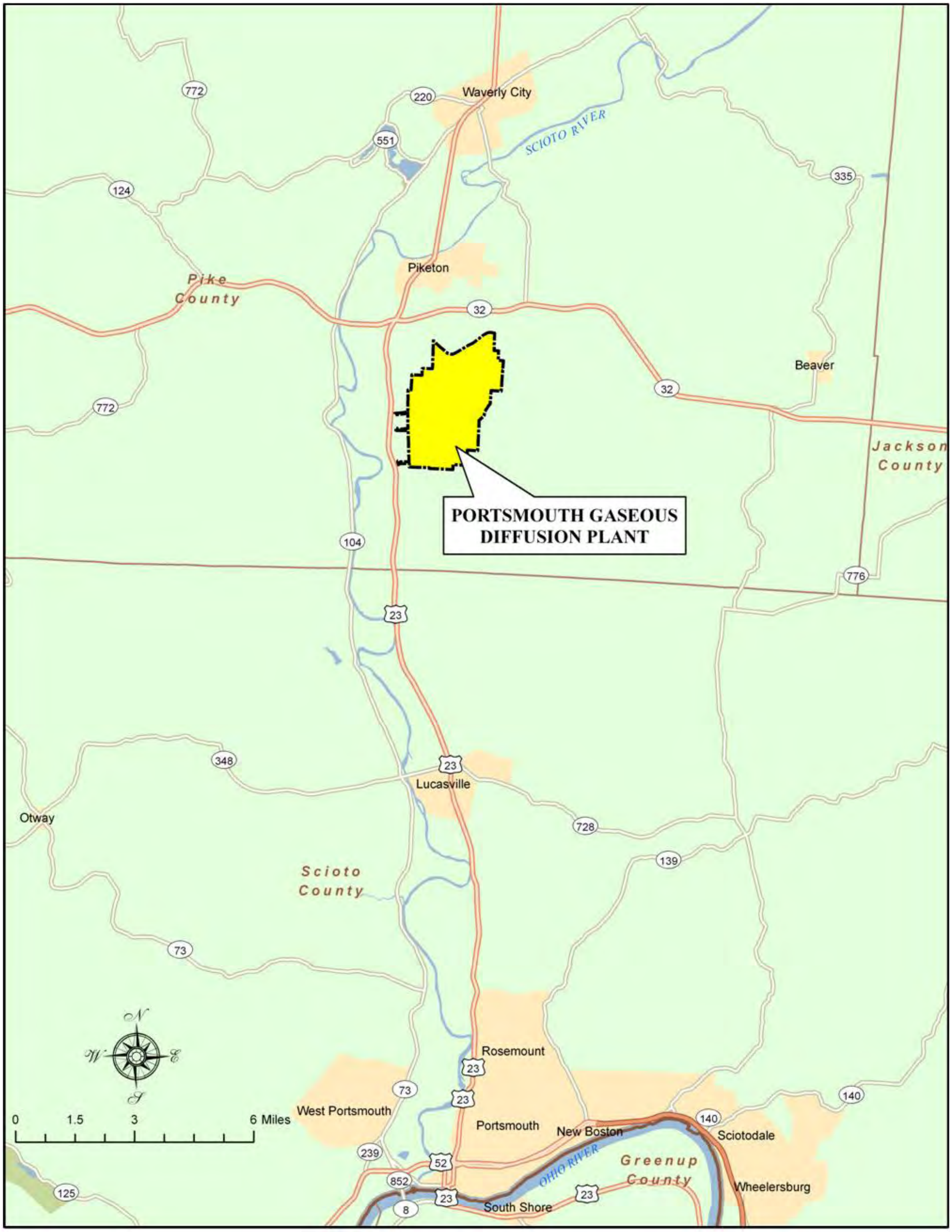

Figure 2. PORTS Site Location Map

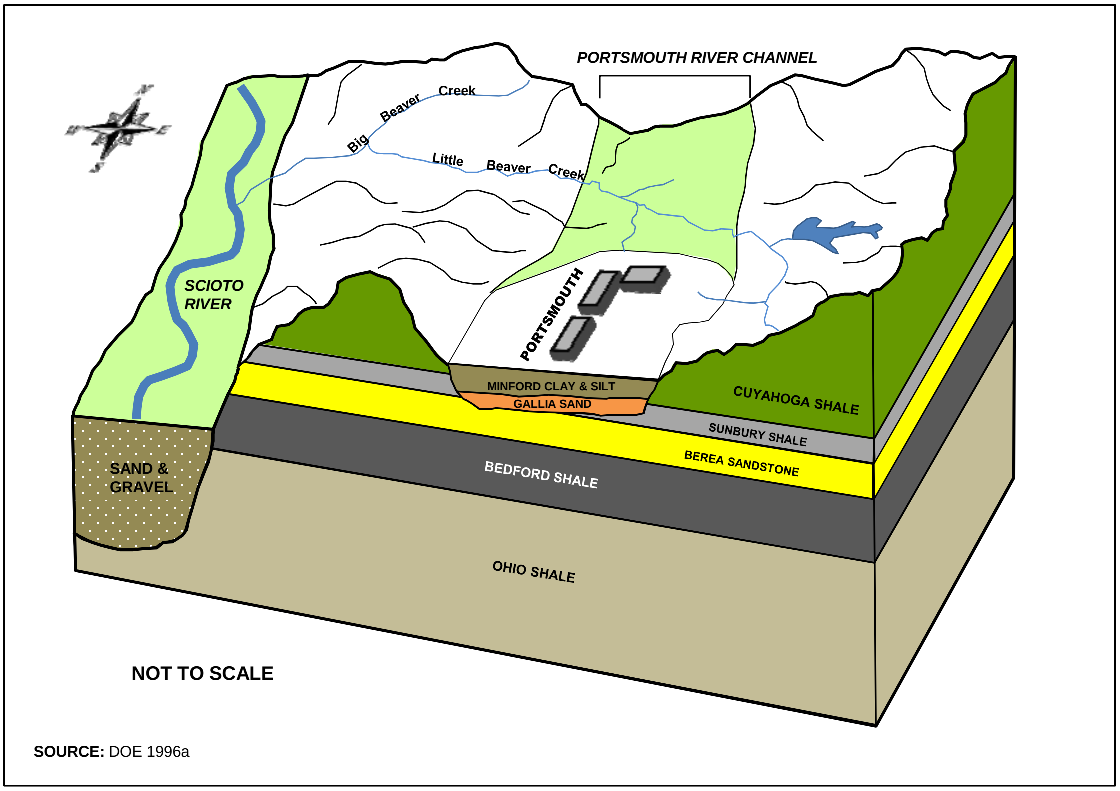

Figure 3. Schematic Block Diagram Showing Geological Relationships at PORTS

unconsolidated Gallia sand and gravel, along with the aquitards of Sunbury shale and unconsolidated Minford clay and silt. The basal portion of the Minford is generally grouped with the Gallia to form the uppermost and primary water-bearing unit at the facility.

Groundwater contaminant plumes that consist primarily of trichloroethene (TCE) are found at six of the PORTS groundwater monitoring areas (Figure 4). These areas include the X-749 Contaminated Materials Disposal Facility/X-120 Old Training Facility/Peter Kiewit Landfill, Quadrant I Groundwater Investigative Area, Quadrant II Groundwater Investigative Area, X-701B Holding Pond, X-740 Waste Oil Handling Facility, and a small plume south of the X-701B area.

A few potential environmentally sensitive areas are located within the PORTS boundary and include areas where Ohio endangered or threatened species have been observed, wetland areas, and the floodplain of Little Beaver Creek. Additionally, Little Beaver Creek is classified as an exceptional warm water stream. The specific sensitive areas are as follows:

- The Northwest Tributary stream corridor is considered a sensitive area because it represents the best habitat for bats at PORTS.

- The area near the southern edge of X-611B sludge lagoon should be considered a sensitive area because of the possible presence of Carolina yellow-eyed grass, which was observed at PORTS in 1994 (DOE 1996a) and a small jurisdictional wetland located near the northern portion of the sludge lagoon.

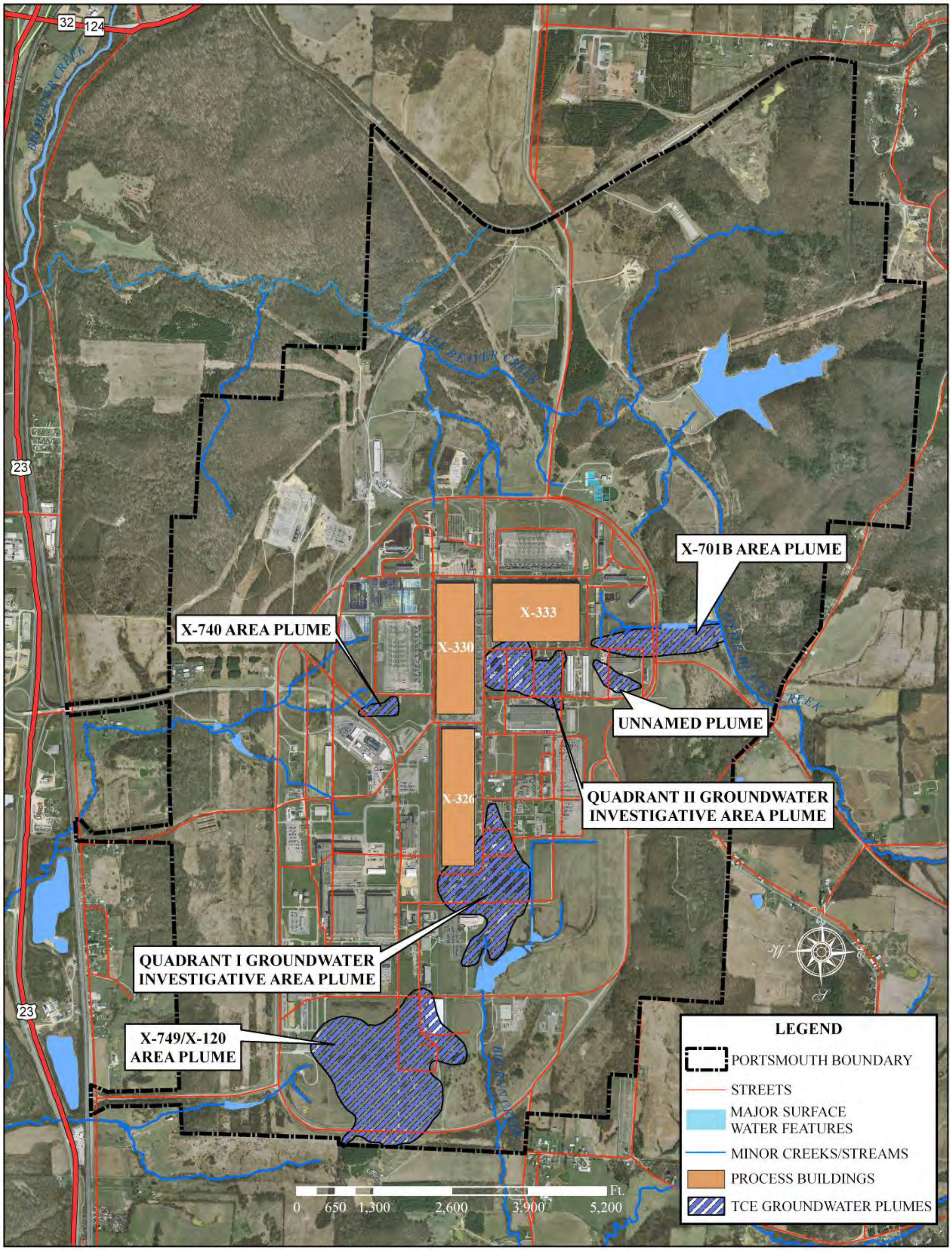

Figure 4. Groundwater Contamination (TCE) in the Gallia Member at PORTS

- The area near the former X-611A lime sludge lagoon, which was remediated as a prairie ecosystem, is a sensitive area because of the presence of Virginia meadow-beauty plant species adjacent to the base of the dike. Wetlands also are present near this area.

No State or Federal parks, forests, nature preserves, conservation areas, designated wild or scenic rivers, or other areas of recreational, ecological, scenic, or aesthetic importance are located within the immediate vicinity of PORTS.

1.2 SUMMARY OF EXISTING SITE DATA

This section summarizes existing, readily available information that will be used during the RI to support the evaluation of waste disposition alternatives in the FS. A significant amount of existing data can be used to evaluate the disposition alternatives for D&D waste. Some of the existing data were derived from current waste disposal activities and previous studies conducted at PORTS. Relevant data from FSs conducted at other DOE sites such as the Fernald site near Cincinnati, Ohio and the Oak Ridge site near Oak Ridge, Tennessee will also be used, as appropriate, to evaluate the waste disposition alternatives. It is anticipated that most identified data gaps or needs can be filled by performing additional research in existing reports and databases. If a data need cannot be resolved using existing data or sensitivity analyses, fieldwork will be considered as presented in later sections of this work plan.

1.2.1 Waste Volume Forecast

The Sitewide Waste Disposition Evaluation RI/FS report will address disposition of waste anticipated to be generated from D&D of the PORTS facilities. The Sitewide Waste Disposition Evaluation RI/FS will also take into consideration the potential volume of environmental media waste anticipated to be generated from future RCRA corrective actions, carried out under both the Consent Decree and a RCRA/ Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Administrative Consent Order. DOE understands that Consent Decree/Administrative Consent Order waste cannot be disposed of in an OSDC without DOE obtaining the appropriate authorization and/or exemptions from Ohio EPA and such waste would have to meet the Ohio EPA-approved waste acceptance criteria (WAC). Preliminary material volumes have been developed using information from the database developed in support of Critical Decision (CD)-1 submittals (DOE 2006a). Data from environmental media and existing landfills will be reviewed to better estimate the potential volume of waste from RCRA corrective actions at the site. Existing landfills might be considered for consolidation into a potential OSDC, in accordance with requirements stipulated in the DFF&O, in the event a RCRA corrective action decision for the landfills determines excavation as a final remedy.

The baseline estimate of waste that potentially will be generated is approximately 2.2 million cy, which includes 1.6 million cy of material from anticipated D&D projects and up to 600,000 cy of environmental media from RCRA corrective actions. These estimates are preliminary and will be refined throughout the RI/FS process. Updated estimates will be presented in the Sitewide Waste Disposition Evaluation RI/FS report.

The waste volumes are categorized by waste type and waste form. Waste type refers to the regulatory classification of the waste. The waste types anticipated are low-level (radioactive) waste (LLW), hazardous waste (RCRA), Toxic Substances Control Act of 1976 (TSCA) waste, mixed LLW (MLLW) (a combination of LLW mixed with RCRA or TSCA waste), and noncontaminated solid waste. The anticipated waste forms are asbestos, concrete, debris, process equipment, and soil. The preliminary volumes categorized by waste types and forms are shown in Tables 1 and 2. These volumes do not take credit for waste volume reduction associated with pollution prevention or waste minimization. Samples will be obtained from the process buildings to allow refinement of the volumetric estimates of waste

types. The RI/FS report will discuss anticipated waste reductions that might be realized from volume/size reduction approaches and/or treatment activities. These volumes are only generated waste volumes. More capacity is needed to account for fill used to control subsidence from the presence of void spaces.

The anticipated potential D&D material volumes are expected to be reasonably accurate because the structures and equipment have had walk downs performed and have been measured and assessed several times. The waste volume presented for RCRA corrective actions was taken from previous evaluations in support of CD-1 (DOE 2006a).

Table 1. Preliminary D&D and Consent Decree/Administrative Consent Order Waste Types and Volumes

Waste Type	Volume (cy)	Weight (tons)
D&D waste		
LLW	1,219,000	2,049,000
MLLW	50,000	79,000
RCRA	1,000	1,000
TSCA	8,000	12,000
Noncontaminated solid waste	273,000	371,000
Total D&D waste	**1,551,000**	**2,512,000**
Consent Decree/Administrative Consent Order waste (anticipated to be generated pursuant to corrective action activities)		
Contaminated environmental media[a]	603,000	814,000
Total D&D and Consent Decree/ Administrative Consent Order	**2,154,000**	**3,326,000**

[a]This refers to soil being generated during the RCRA corrective action process and does not imply soil will be a RCRA-listed or characteristically hazardous waste.

General Notes:
1. Volume estimates represent uncontainerized waste with no adjustments for expansion or compaction.
2. Numbers have been rounded.
3. Noncontaminated solid waste is not expected to contain radioactive contaminants.
4. Security classified waste would be categorized as LLW or MLLW.
5. Consent Decree/Administrative Consent Order waste cannot be disposed of in an OSDC without DOE obtaining the appropriate authorization and/or exemptions from Ohio EPA and such waste would have to meet the Ohio EPA approved WAC.

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
D&D = decontamination and decommissioning
DOE = U.S. Department of Energy
LLW = low-level waste
MLLW = mixed low-level waste
Ohio EPA = Ohio Environmental Protection Agency
OSDC = on-site disposal cell
RCRA = Resource Conservation and Recovery Act of 1976
TSCA = Toxic Substances Control Act of 1976
WAC = waste acceptance criteria

Table 2. Preliminary D&D and Consent Decree/Administrative Consent Order Waste Forms and Volumes

Waste Form	Volume (cy)	Weight (tons)
D&D waste		
Asbestos	51,000	75,000
Concrete	420,000	988,000
Debris	534,000	857,000
Process equipment	280,000	151,000
Soil	266,000	441,000
Total D&D waste	**1,551,000**	**2,512,000**
Consent Decree/Administrative Consent Order waste (anticipated to be generated pursuant to corrective action activities)		
Soil or soil-like and below-ground debris	603,000	814,000
Total D&D and Consent Decree/ Administrative Consent Order waste	**2,154,000**	**3,326,000**

General Notes:
1. Volume estimates represent uncontainerized waste with no adjustments for expansion or compaction.
2. Numbers have been rounded.
3. Waste from D&D of utilities and infrastructure are included as debris.
4. Asbestos waste consists of any material, such as insulation, that contains asbestos fibers, including transite siding, building pipe, floor tile, and cable insulation. It is likely that asbestos-containing material will be prevalent in most demolition debris.
5. Concrete waste consists of demolition and building materials, including concrete pads, floors, pillars, basements, and concrete building construction materials.
6. Debris is waste demolition material from razing buildings, including wood, rubber, concrete that could not be separated from the rubble, metallic items other than process equipment, siding, gypsum, roofing material, flooring, and brick.
7. Process equipment waste consists of equipment and associated appurtenances directly used for uranium enrichment, including compressors, converters, motors, process piping, and valves.
8. D&D soil volume includes residual soil that adheres to the concrete foundations or otherwise must be excavated as part of D&D activities. The basis for this estimate is 18 in. of soil over the areal extent of the building footprint.
9. Consent Decree/Administrative Consent Order waste cannot be disposed of in an OSDC without DOE obtaining the appropriate authorization and/or exemptions from Ohio EPA and such waste would have to meet the Ohio EPA approved WAC.

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
D&D = decontamination and decommissioning
DOE = U.S. Department of Energy
Ohio EPA = Ohio Environmental Protection Agency
OSDC = on-site disposal cell
RCRA = Resource Conservation and Recovery Act of 1976
WAC = waste acceptance criteria

The following activities are being performed to refine the volume estimates for the RI/FS:

- Inventory of installed and spare process equipment
- Evaluation of assumptions used for volume estimates of the floor slabs and footers and estimation of the residual soil volumes to be removed as part of the Site D&D
- Estimation of the quantity of metal and classified (from a security perspective) waste
- Evaluation of the categorization of waste types using process knowledge and characterization data
- Review of lessons learned regarding volume estimates from other DOE D&D projects.

In addition, an assessment of available data to support the volumes has led to a conclusion that additional contaminant data are needed to better determine which waste streams would potentially meet the OSDC WAC and, therefore, refine the volume estimates for the on-site disposal alternative. Once the volumes are finalized, they will be adjusted to match the requirements of the individual waste disposition

alternatives. The finalized volumes will be used in the RI/FS to establish the size and siting requirements for the on-site alternative.

1.2.2 Current Disposal Practices

Currently, all waste generated at PORTS is packaged and transported to licensed off-site waste disposal facilities. This section provides a summary of the current waste disposal practices at PORTS. Information and experience gained from current waste disposal practices will be used in the evaluation of waste disposition alternatives.

The *Waste Management Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* [Theta Pro2Serve Management Company, LLC (TPMC) 2006a] outlines the current practices at PORTS. The current waste management program follows DOE Order 435.1, *Radioactive Waste Management* (DOE 2001a), and DOE Manual 435.1-1, *Radioactive Waste Management Manual* (DOE 2001b). Accordingly, contractors performing waste management activities are required to establish appropriate programs in quality assurance (QA), safety management, transportation, training, and conduct of operations to ensure the safe, effective storage, handling, and disposition of waste.

Several non-time-critical removal actions are in process and more are being planned at PORTS for the near term. These projects are following the current waste practices at the site, and waste management and disposition decisions are being made on an individual project basis. All wastes are being shipped off site (with the exception of wastewater, such as decontamination water, which would be sampled and disposed of via an on-site treatment facility or a National Pollutant Discharge Elimination System [NPDES] outfall) to appropriately licensed facilities for disposal.

The emphasis with current waste management practices at PORTS is transportation compliance and profile assignment. Characterization is aimed at moving waste off site quickly and in a compliant manner. The wastes are packaged and transported according to applicable Federal, State, and/or local hazardous material and radioactive material regulations.

1.2.2.1 Waste disposal facilities

Off-site waste disposal facilities currently being utilized include existing DOE and commercial facilities that are licensed or permitted to accept wastes, including LLW, hazardous, TSCA, MLLW, and TSCA/LLW waste types. The DOE-owned Nevada National Security Site (NNSS), formerly known as the Nevada Test Site, is used for some waste disposition, such as classified waste. MLLW and LLW are sent directly to the Energy*Solutions* facility in Utah for disposition (waste meeting land disposal restrictions [LDRs]) or to Energy*Solutions* or PermaFix for treatment prior to going to Energy*Solutions* or NNSS for disposition (waste exceeding LDRs). The PORTS site has also used the Pike Sanitation Landfill for appropriate solid waste material.

1.2.2.2 Waste packaging

Several types of containers are used at PORTS when preparing waste for off-site disposal. The type of container used is primarily dependant on the waste category. Containers are either purchased or rented and are disposed with the waste or decontaminated and reused. Additionally, the type of container used also determines the type of equipment needed to move and load the waste onto the transport vehicle.

Small containers. Small containers used include lab packs, B-25 boxes, drums, and overpacks, which are designed to contain various waste forms (e.g., debris, solid, granular, etc.) and types (e.g., LLW, RCRA, etc.). Small containers are applicable to certain specific candidate waste streams and are typically disposed with the waste rather than emptied and reused.

Large containers. Large containers include roll-off bins, cargo containers, intermodal containers, and other containers with various weight and volume capacities, loading capabilities (top-, side-, or end-loaded), and handling characteristics. Large containers can be moved by forklift, crane, or they can be winched onto a truck bed. Some truck-mounted containers can be unloaded directly by dumping from the truck, while other containers must be removed and unloaded with additional equipment. Rail transportation most often includes the use of gondola containers (40 cy) or intermodal/cargo containers. A variety of waste forms and types can be loaded into these containers. Large containers can usually be decontaminated and reused. Dedicated containers can be reused for similar waste streams with only external decontamination.

Bulk containers. Bulk containers are single-use containers typically disposed with the waste. A large reinforced bag, called a Super Sack®[1], is an example of a bulk waste package that usually contains soil or soil-like waste forms.

1.2.2.3 Waste transportation

The primary modes of transportation for shipping waste from PORTS to off-site disposal facilities include truck and train. Some facilities that are utilized, such as NNSS, do not have rail access and, therefore, cannot receive waste directly by train.

Truck. Truck transport is applicable to both local and long-distance waste transport. Trucks can transport bulk wastes either in containers or in closed beds that provide adequate containment. Additional considerations include DOE approval of the trucking companies via the DOE Consolidated Audit Program and the requirement for truck drivers to have a current commercial driver's license with a U.S. Department of Transportation (DOT) Hazardous Materials endorsement. All off-site disposal facilities currently used by PORTS are configured to receive waste directly via truck.

Train. Rail transport is used only for long-distance waste transport. Railcars are loaded directly at PORTS with containerized waste or bulk waste. A small portion of the on-site rail infrastructure at PORTS is currently being used to load flatbed railcars with intermodal containers of radioactively contaminated debris and scrap metal for off-site shipment and disposal (TPMC 2007). The Energy*Solutions* facility and the Waste Control Specialists facility near Andrews, Texas, are configured to accept waste via rail. Shipment to other off-site disposal facilities requires either transfer of the waste from railcars to trucks for the last leg of the trip or construction of a rail spur from the nearest rail line to the disposal facility.

1.2.3 Disposal Decisions at Other DOE Sites

Waste disposition decisions at other DOE sites will be reviewed for specific and relevant information or approaches that that are useful for this site may be incorporated into the evaluation for PORTS. For example, uptake factors and model assumptions that have been accepted at other sites could be applied at PORTS. The processes and documents developed from other DOE sites can provide reference material, experience, best practices, and other lessons learned for the development and evaluation of waste disposition alternatives at PORTS.

DOE has conducted CERCLA waste disposition evaluations at several sites across the DOE complex. A waste disposition evaluation is presently being conducted at the Paducah Gaseous Diffusion Plant in

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[1]Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Paducah, Kentucky. Each of these evaluations provides information and experience that can assist in the development and evaluation of disposition alternatives at PORTS. DOE CERCLA waste disposal evaluations of various alternatives have resulted in the construction of on-site waste disposal facilities as the preferred alternative at the following sites:

- Fernald, Ohio
- Oak Ridge, Tennessee
- Hanford, Washington
- Idaho National Laboratory, Idaho
- Weldon Spring, Missouri.

These CERCLA disposal facilities have accepted only, or currently accept in the case of operating facilities, cleanup waste associated with the site on which it is located and no off-site waste from other DOE sites is accepted. Each disposal facility received public input during the evaluation process and each was approved, designed, and constructed in collaboration with Federal and State regulators, and was sized to be responsive to CERCLA cleanup needs.

Each of the CERCLA disposal facilities was approved through the issuance of a ROD that required protectiveness of human health and the environment, and attainment of action-specific, contaminant-specific, and site-specific applicable or relevant and appropriate requirements (ARARs). Although each CERCLA disposal facility has unique features, the design criteria are generally consistent, and each facility demonstrated compliance with the same set of Federal design criteria for LLW and hazardous waste disposal. The cover and liner designs of each facility are very similar. Understanding the evaluation process used at these DOE sites as well as lessons learned and experience gained in conducting these evaluations will contribute to the development and evaluation of the on-site disposal alternative for PORTS. Of particular interest for PORTS will be WAC development and information related to design of the OSDC.

At the Rocky Flats Environmental Technology Site in Colorado, and the Mound site in Ohio, DOE did not perform an integrated evaluation of sitewide waste disposal. Off-site waste disposal was used on a project-by-project case at both sites. Wastes generated during the cleanup and closure of Rocky Flats were shipped to NNSS, the Waste Isolation Pilot Plant, and/or commercial disposal facilities. Waste from the Mound site was shipped to the NNSS and commercial off-site disposal facilities.

1.2.4 Previous Site-screening Study

From 2002 through 2009, DOE prepared several documents that evaluated a potential OSDC at PORTS. Much of the information needed to define the layout, land space requirements, land space constraints, and preliminary conceptual design already exists. These documents include the following:

- Preliminary assessment (BJC 2002)
- Identification and screening of candidate sites (BJC 2003a)
- Waste volume/characteristics inventory (BJC 2003b)
- On-site waste disposal facility conceptual design (DOE 2006b).

For this Sitewide Waste Disposition Evaluation project, the previous site-screening study has been revisited to take into account any changes in anticipated waste volume, land use, or other changes that have occurred since 2003. For purposes of the Sitewide Waste Disposition Evaluation RI/FS, four sites are being further evaluated (Figure 5). Further discussion of the siting process is provided in

Appendix A. The areas discussed in these previous siting studies are described in more detail in the RCRA Facility Investigations completed in 1996.

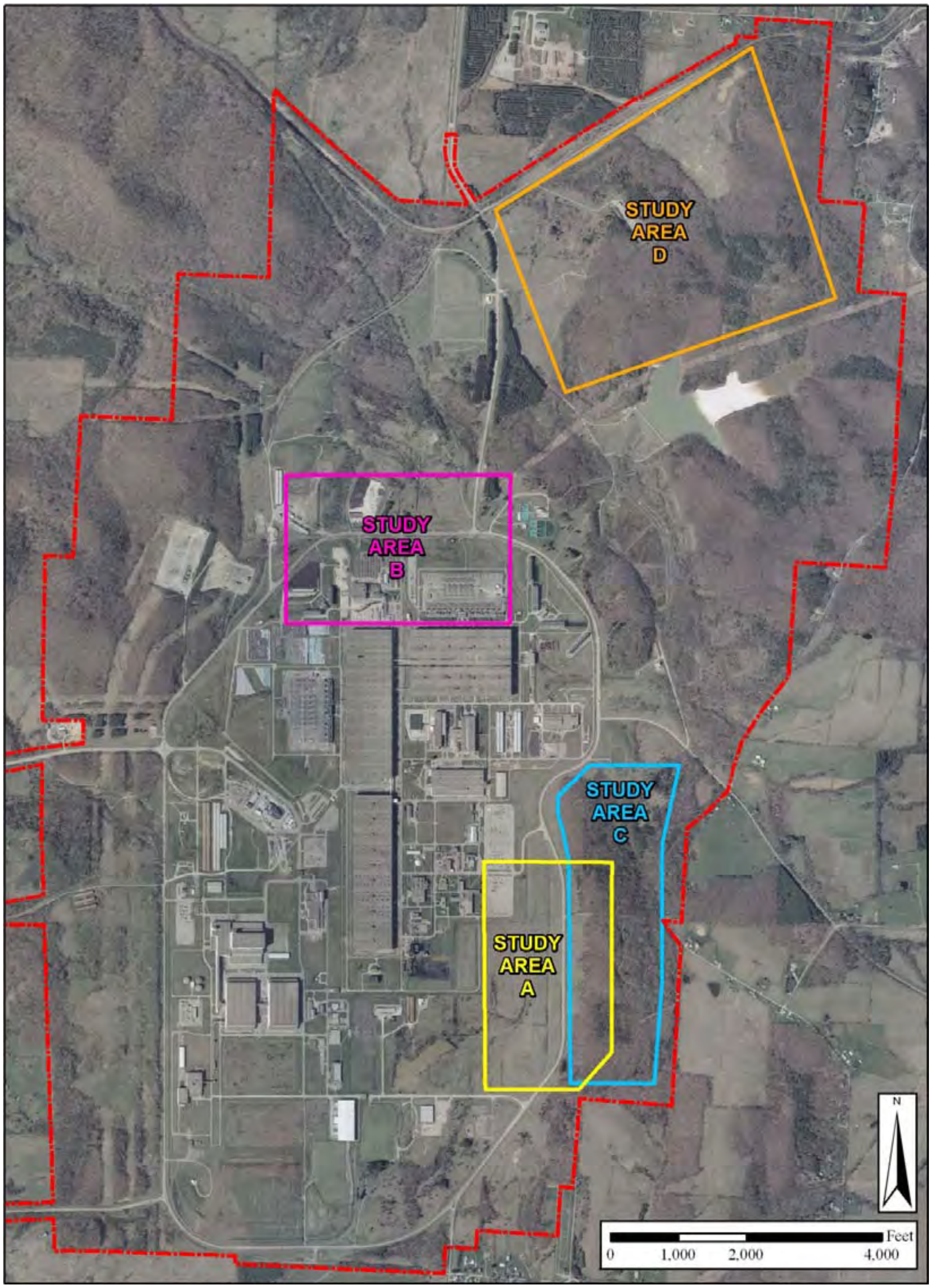

Figure 5. Four Study Areas for a Potential On-site Waste Facility Being Evaluated in the RI/FS for PORTS

1.2.5 Existing Study Area Data

Development and evaluation of the on-site disposal alternative requires data on geochemical properties of the soil for groundwater modeling and WAC development. Geotechnical data are required to determine soil properties such as subsidence, compaction, permeability, etc. for the facility design. More discussion on the needed types of data is provided in Section 3.3.

Considerable existing geologic and hydrogeologic data are available for PORTS, including data from more than 1,600 soil borings drilled at the site (TPMC 2006b). This data can be found in facility investigation and corrective measures reports for the four site quadrants, as well as in annual groundwater reports. Data regarding depth to groundwater is sufficient over most of the site. Additional depth data may need to be collected, depending on the specific locations for a potential disposal cell.

Existing geochemical data includes total organic carbon (TOC) and cation exchange capacity (CEC) data collected during previous investigations and PORTS-specific soil adsorption coefficients (K_d values) derived for a vadose zone soil-leaching study performed in 1994. The locations where TOC and CEC samples have been collected in relation to potential sites for an OSDC are shown in Figure 6. Some of the sampling locations where CEC data were collected near X-616 (20 samples from four soil borings) have not been plotted on Figure 6 because of questionable coordinates in the database. The TOC and CEC data reviewed for this work plan were extracted from the site database on May 21, 2010.

The available TOC and CEC soil data are summarized in Table 3. Data evaluated for this table are limited to samples that identified a specific depth of sampling. The TOC data, which have a lognormal distribution (Figure 7), range from 0.00008 to 0.0082 kg/kg and have a geometric mean of 0.0009 kg/kg or 0.09 percent. The CEC data have a normal distribution ranging from 4.8 milliequivalent (meq) per 100 g to 25.0 meq/100 g with a mean of 13.9 meq/100 g.

Table 3. Summary of Existing Soil TOC and CEC Data

	TOC (kg/kg)	**CEC (meq/100 g)**
Minimum	0.00008	4.8
Maximum	0.0082	25.0
Mean	0.0009	13.9
Distribution	Lognormal	Normal
Number of samples	94	47

CEC = cation exchange capacity
TOC = total organic carbon

The soil adsorption coefficients (K_d) for contaminants of interest are both chemical- and site-specific. The K_d value of an organic contaminant, such as TCE, is calculated using the TOC values from the soil. The K_d values are used for fate and transport modeling and have an indirect influence on the transport of contaminants. That is, the greater the K_d value, the more adsorption to soil, which results in reduced contaminant transport through the groundwater pathway. The K_d values for selected metals at PORTS were measured experimentally to support preliminary remediation goal (PRG) development in 1994 (DOE 1994a).

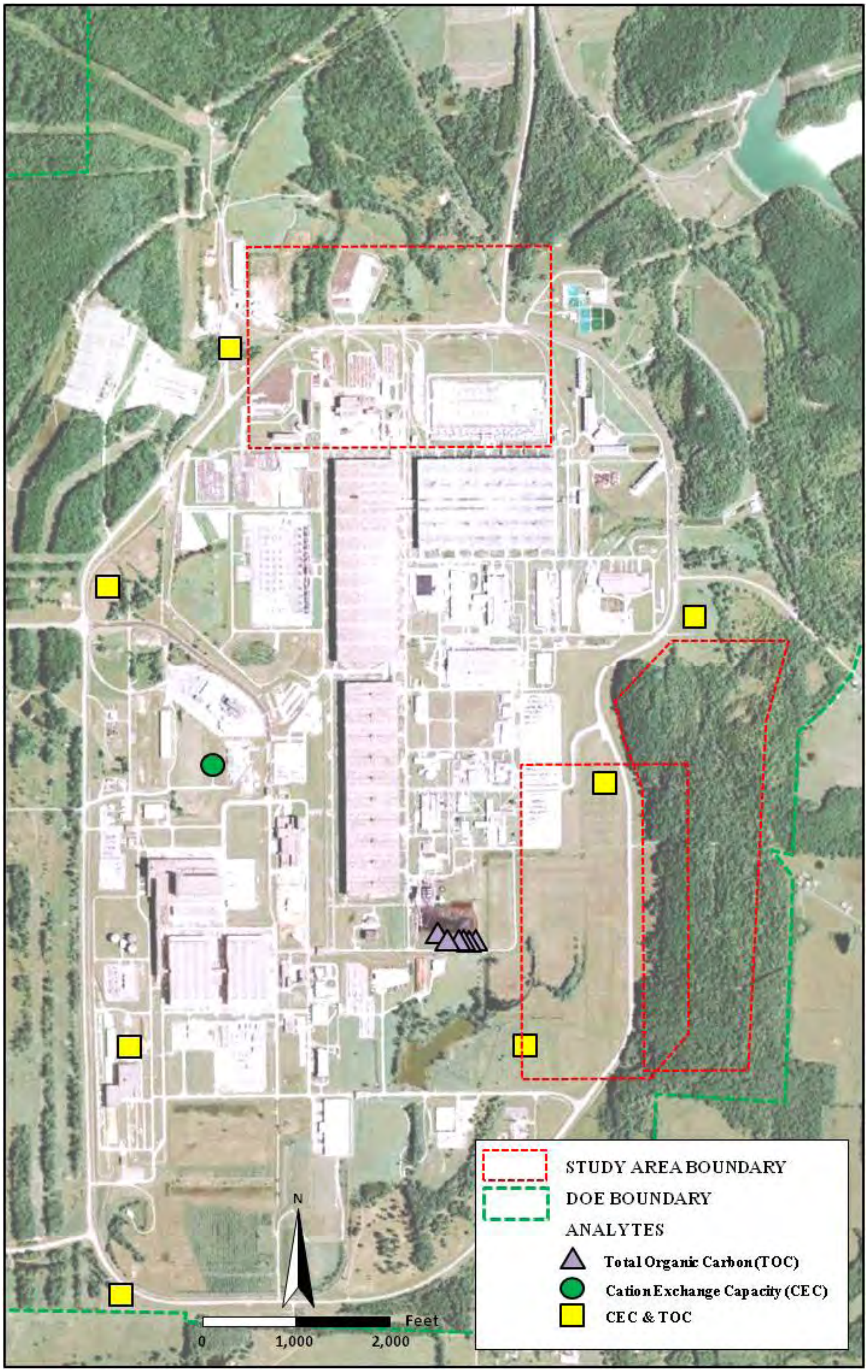

Figure 6. Existing Locations for Soil TOC and CEC Data at PORTS

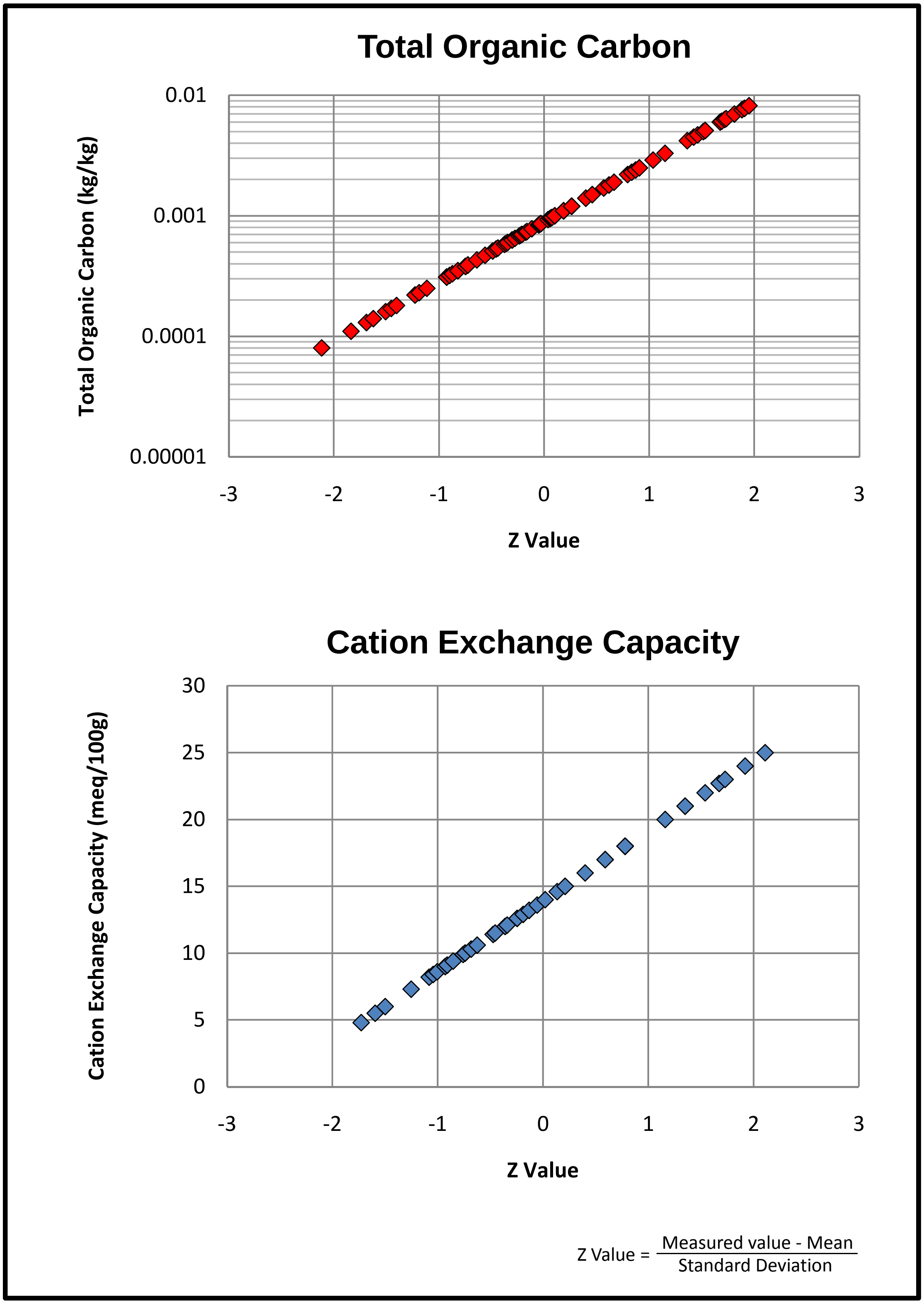

Figure 7. Probability Plots for Soil TOC and CEC at PORTS

Site-specific K_d values were measured for antimony, arsenic (V), barium, cadmium, chromium (III and VI), lead, manganese, and mercury using a 24-hour, batch-type procedure (American Society for Testing and Materials D4646-87) on Minford silty, clayey soil. The values determined from the previous study are shown in Table 4.

Table 4. Soil Adsorption Coefficients Previously Measured at PORTS

Contaminant	Soil adsorption coefficient (ml/g)
Antimony	422
Arsenic (V)	208
Barium	545
Cadmium	48.5
Chromium (III)	810
Chromium (VI)	7
Lead	28,300
Manganese	16.5
Mercury	41

Source: DOE 1994a

Geotechnical information is sparse for the four sites being evaluated for a potential OSDC. Most existing geotechnical data are related to foundation studies for the gaseous diffusion plant facilities and the centrifuge project facilities. A geotechnical study was completed for a proposed sanitary landfill (X-737) near the X-735 Landfill and Study Area D, and for a gaseous diffusion plant add-on facility near Study Area A, neither of which were constructed. Therefore, geotechnical information specific to each of the four sites will need to be collected.

The Minford consists primarily of over-consolidated lean clays and silts. Based on several thousand split-spoon samples, fat clays constitute approximately 8 percent of the Minford, lean clays constitute about 59 percent, and silts constitute approximately 33 percent (Law Engineering 1978). Plastic limits of the clays are relatively constant with depth and average approximately 20. Liquid limits typically decrease with depth. In situ moisture contents are generally within 5 percent of the plastic limit, which is typical for over-consolidated clays. As expected with over-consolidated soils, the Minford soils are quite strong (Law Engineering 1978) as evidenced by standard penetration resistance values.

Several measurements of vertical permeability in the Minford have been collected. In the area of the gas centrifuge plant, 42 measurements were made on clay and silt samples. Another eight samples from the X-737 area were collected and tested. A summary of the results is provided in Table 5.

Table 5. Vertical Permeability Measurements in the Minford Clay

	Minimum (cm/s)	Maximum (cm/s)	Geometric mean (cm/s)	Number of measurements
Centrifuge Plant Area	1.1E-08	6.1E-06	5.3E-07	42
X-737 Area	3.3E-08	4.4E-06	5.8E-07	8
Summary	1.1E-08	6.1E-06	5.5E-07	50

Two previously used borrow areas exist in the northern portion of the DOE property within Study Area D. These areas were used as a source of residual clayey soil, which developed on weathered Cuyahoga Shale, for landfill cover material. The proposed X-737 landfill was planned near the western borrow area. The existing geotechnical data from this area was primarily collected from the Minford clay. No geotechnical data were collected from near the eastern borrow area.

Analytical data for contaminants present in soils within the potential OSDC sites mentioned in Section 1.2.4 have been reviewed and compared to Minford soil background concentrations for PORTS (DOE 1996b) and applicable PRG values for the purpose of determining if residual contamination from plant operations is present in the locations. Even where data may exceed the background value, it may still fall within the background range. PRG values are used for screening to aid in identifying if an area warrants further evaluation. Additional analysis, including statistical evaluation, of the data, as well as collection of samples from these areas for geotechnical and geochemical analyses, will occur during the RI/FS.

The data presented below were extracted from the site database in June 2010. Existing sample locations for Study Area A, where samples were collected from 0 to 2 ft bgs, are shown in Figure 8. Locations where samples were collected from 2 to 10 ft bgs are shown in Figure 9. Generally, at Study Area A, most constituents were found at or near background levels. A summary of data from Study Area A is shown in Table 6.

Existing sample locations for Study Area B, where samples were collected from 0 to 2 ft bgs, are shown in Figure 10, and locations where samples were collected from 2 to 10 ft bgs are shown in Figure 11. As expected with Study Area B being located within the industrialized portion of the facility, more of the constituents exceed background and/or PRGs than at Study Area A. There were a few detections of semivolatile organic compounds (polychlorinated biphenyls [PCBs] and polycyclic aromatic hydrocarbons), and three detections of TCE within the upper 10 ft of soil. Data from Study Area B are summarized and compared to the screening values in Table 7.

Existing sample locations for Study Area C, where samples were collected from 0 to 2 ft bgs, are shown in Figure 12. Sample locations where samples were collected from 2 to 10 ft bgs are shown in Figure 13. Study Area C has many sample constituents near background levels because of its location away from past industrial activity areas at the site. A summary of the data from Study Area C is shown in Table 8.

Most of the existing data for Study Area C are from outside of the study area boundaries and may not be representative of the site conditions. Additional data will be collected from this area.

Existing sample locations for Study Area D are shown in Figure 14. Based on the data in the PORTS GIS Data Warehouse, all analytical data at Study Area D are shallow (less than 2 ft depth). Study Area D has most sample constituents near background levels because of its location away from past industrial activity areas at the site. A summary of the data from Study Area D is shown in Table 9. Many of the uranium samples in Table 9 are not shown on Figure 14. These data were collected for a project to evaluate a 340-acre parcel that is approximately coincident with Study Area D; however, the coordinates of the specific sample locations are not reported in the database. Also, during the project to evaluate the 340-acre parcel, all soil samples collected contained very low detections of transuranic radionuclides (americium-241, plutonium-238, and plutonium-239/-240). While these constituents are not naturally occurring, the maximum detected activity concentrations are well below the residual screening levels in *Methods for Conducting Human Health Risk Assessments and Risk Evaluations at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE 2011, Draft).

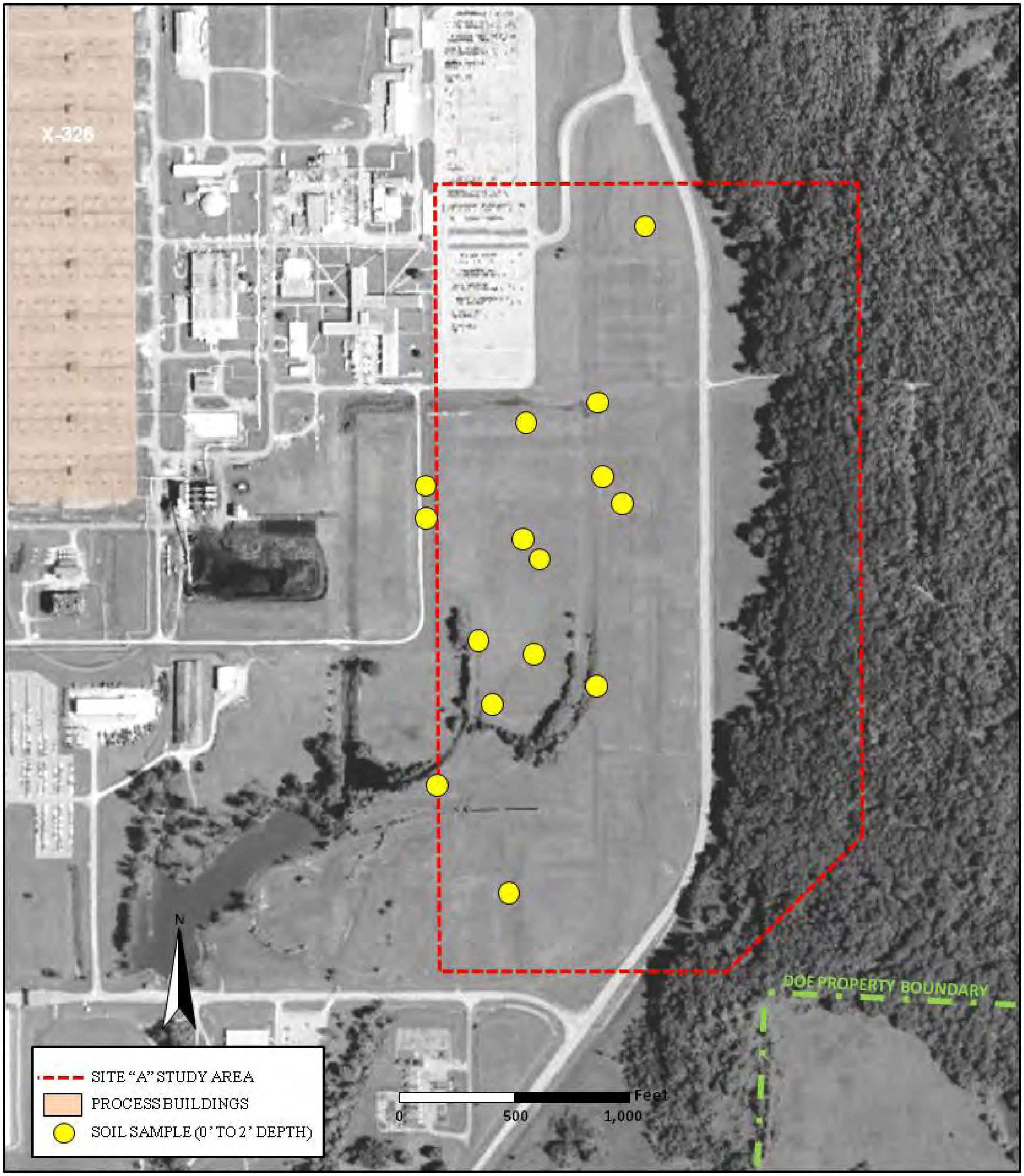

Figure 8. Locations of Soil Samples Collected from 0- to 2-ft Depth in Study Area A at PORTS

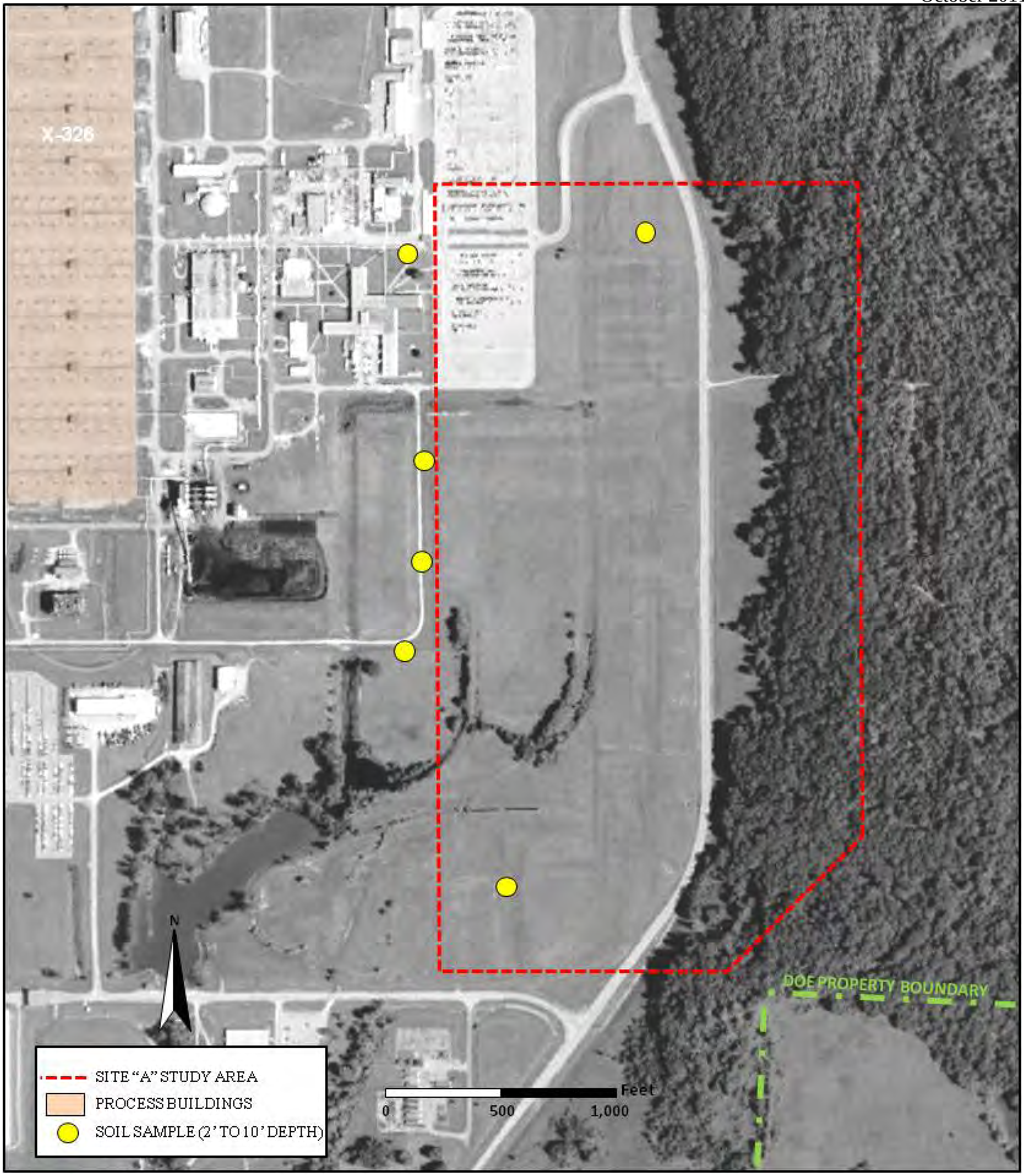

Figure 9. Locations of Soil Samples Collected from 2- to 10-ft Depth in Study Area A at PORTS

Table 6. Soil Contaminant Screening at Study Area A

Analysis	Detected results		Frequency of detection	Bkg value	Exceeds bkg	Industrial PRG for 10E-5 risk	Industrial PRG for HI = 1	Exceeds industrial PRG (risk and/or HI)
	Minimum	Maximum						
0- to 2-ft depth								
Metals (mg/kg)								
Arsenic	1.10E+01	1.80E+01	7/7	31	0/7	38.1	NA	0/7
Barium	5.70E+01	9.30E+01	6/6	181	0/6	NA	355,000	0/6
Beryllium	5.50E-01	1.00E+00	5/6	1.4	0/6	NA	3,940	0/6
Cadmium	5.70E-01	1.50E+00	5/6	2	0/6	NA	1,970	0/6
Chromium	6.30E+00	1.90E+01	11/11	28.6	0/11	113	NA	0/11
Cobalt	8.50E+00	2.10E+01	6/6	28.2	0/6	NA	602	0/6
Copper	7.40E+00	1.40E+01	6/6	32.6	0/6	NA	81,800	0/6
Lead	1.20E+01	4.60E+01	6/6	32	**1/6**	NA	800	0/6
Mercury (inorganic salts)	3.00E-02	4.20E-02	2/7	0.048	0/7	NA	611	0/7
Nickel	9.00E+00	2.30E+01	6/6	34	0/6	NA	37,700	0/6
Silver	4.90E+00	1.40E+01	5/6	2.5	**5/6**	NA	10,200	0/6
Uranium	3.00E+00	7.40E+00	11/11	4.8	**2/11**	NA	6,110	0/11
Vanadium	2.30E+01	5.40E+01	6/6	50.2	**1/6**	NA	18,400	0/6
Zinc	2.30E+01	7.10E+01	10/11	101	0/11	NA	613,000	0/11
Radionuclides (pCi/g)								
Technetium-99	NA	2.00E-01	1/12	NA	NA	17,100	NA	0/12
2- to 10-ft depth								
Metals (mg/kg)								
Arsenic	3.00E+00	1.90E+01	7/7	31	0/7	38.1	NA	0/7
Barium	5.50E+01	1.80E+02	7/7	181	0/7	NA	355,000	0/7
Beryllium	5.70E-01	1.10E+00	4/7	1.4	0/7	NA	3,940	0/7
Cadmium	6.90E-01	1.10E+00	3/7	2	0/7	NA	1,970	0/7
Chromium	5.40E+00	2.60E+01	7/7	28.6	0/7	113	NA	0/7
Cobalt	3.10E+00	2.00E+01	7/7	28.2	0/7	NA	602	0/7
Copper	7.10E+00	2.60E+01	7/7	32.6	0/7	NA	81,800	0/7

Table 6. Soil Contaminant Screening at Study Area A (Continued)

Analysis	Detected results: Minimum	Detected results: Maximum	Frequency of detection	Bkg value	Exceeds bkg	Industrial PRG for 10E-5 risk	Industrial PRG for HI = 1	Exceeds industrial PRG (risk and/or HI)
2- to 10-ft depth (continued)								
Metals (mg/kg) (continued)								
Lead	6.30E+00	2.00E+01	7/7	32	0/7	NA	800	0/7
Mercury (inorganic salts)	ND	ND	0/7	0.048	0/7	NA	611	0/7
Nickel	7.90E+00	5.50E+01	7/7	34	**1/7**	NA	37,700	0/7
Silver	3.60E+00	9.10E+00	5/7	2.5	**5/7**	NA	10,200	0/7
Uranium	2.80E+00	5.60E+00	7/7	4.8	**1/7**	NA	6,110	0/7
Vanadium	2.40E+01	4.50E+01	7/7	50.2	0/7	NA	18,400	0/7
Zinc	2.10E+01	8.50E+01	7/7	101	0/7	NA	613,000	0/7
Radionuclides (pCi/g)								
Technetium-99	3.00E-01	3.00E-01	2/7	NA	NA	17,100	NA	0/7

Notes:
1. **Bolding** indicates screening criteria have been exceeded.
2. Bkg values are from *Background Sampling Investigation of Soil and Groundwater Final Report for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE 1996b).
3. PRGs are for the industrial worker and were taken from the PORTS risk methods document (DOE 2011a).
4. PRG for chromium is for VI (sample results were not speciated).
5. PRG for lead from EPA OSWER Directive 9355.4-12 (EPA 1994).

Bkg = background
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
HI = hazard index
NA = not applicable
ND = not detected
OSWER = Office of Solid Waste and Emergency Response
PORTS = Portsmouth Gaseous Diffusion Plant
PRG = preliminary remediation goal

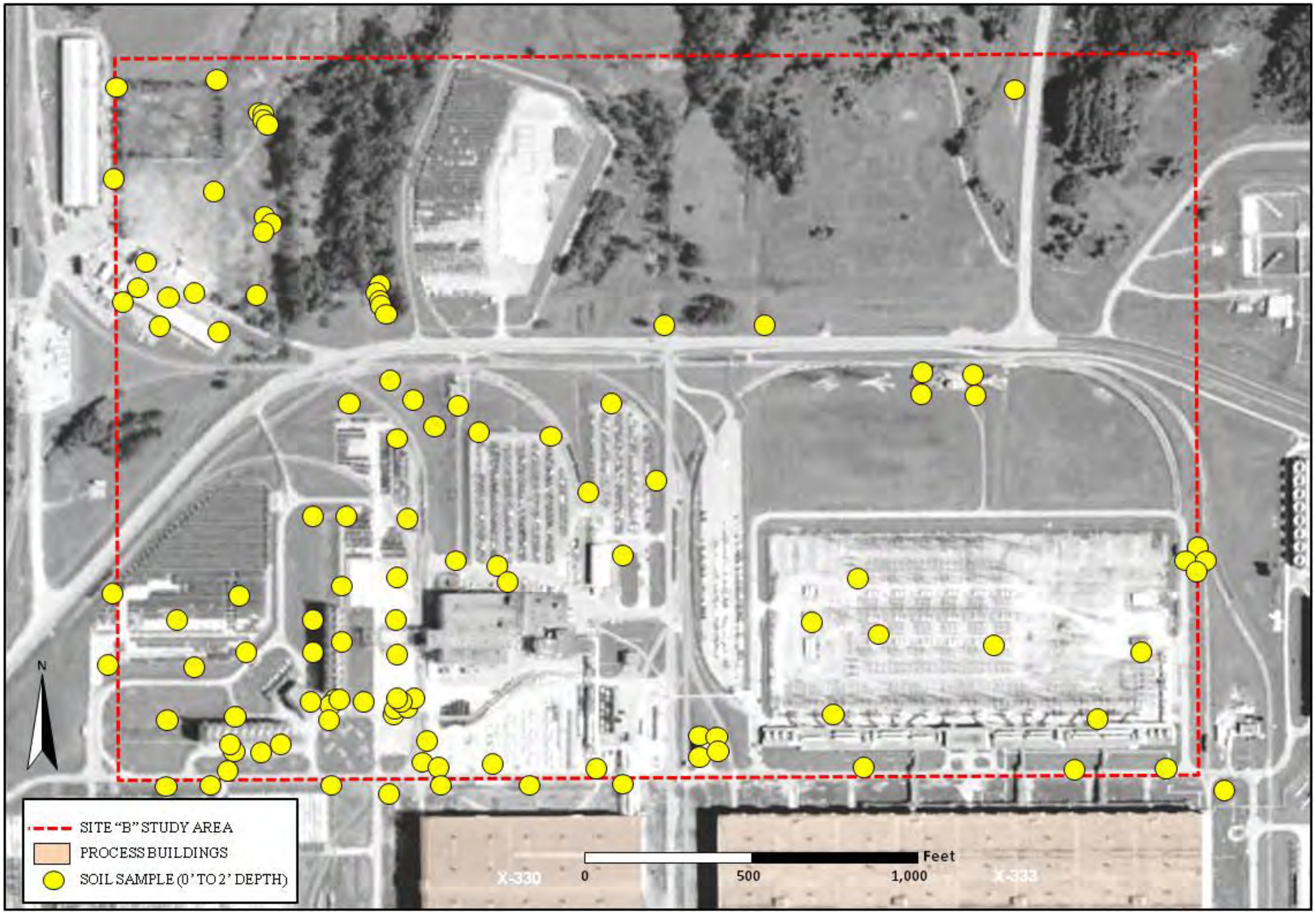

Figure 10. Locations of Soil Samples Collected from 0- to 2-ft Depth in Study Area B at PORTS

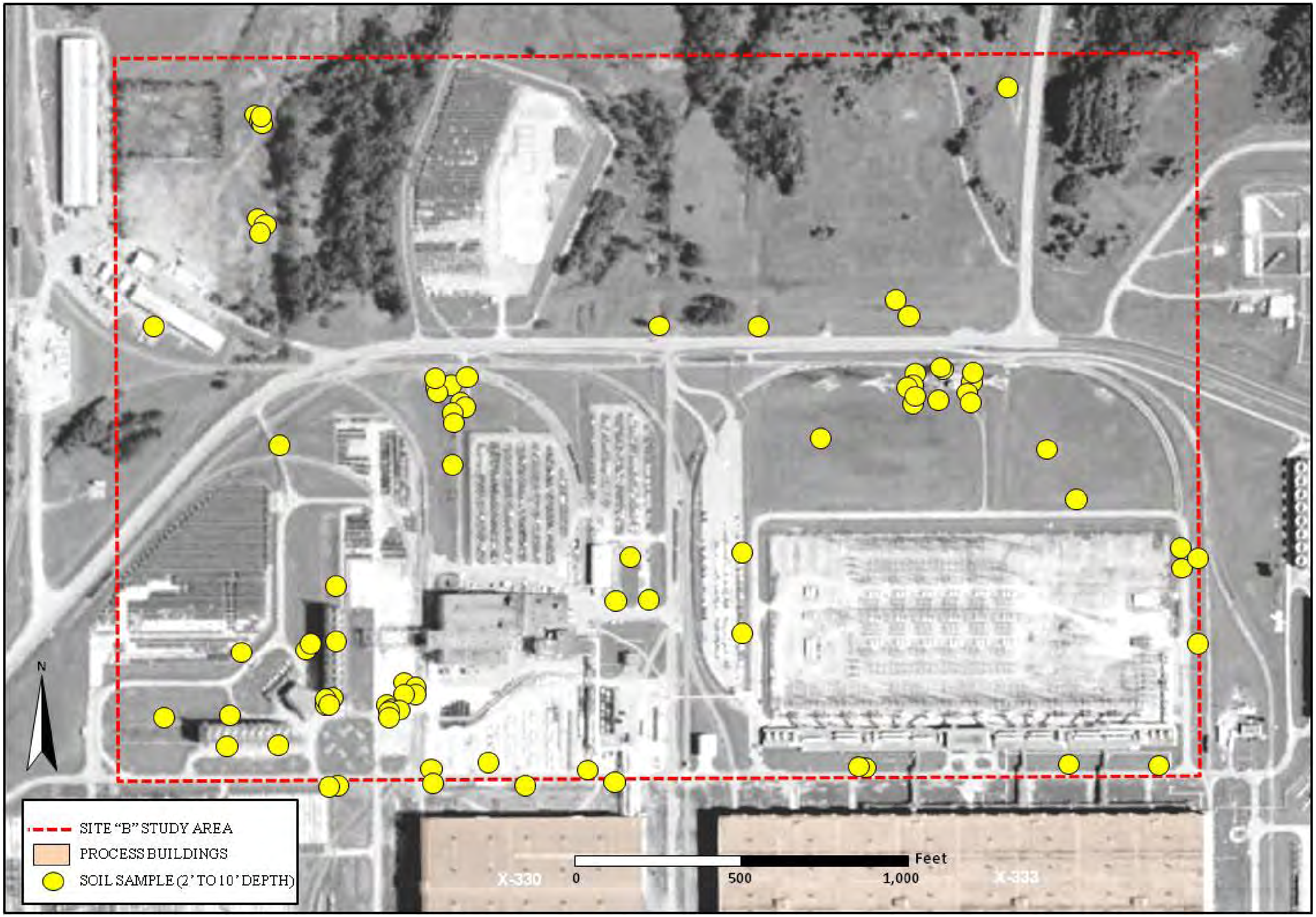

Figure 11. Locations of Soil Samples Collected from 2- to 10-ft Depth in Study Area B at PORTS

Table 7. Soil Contaminant Screening at Study Area B

Analysis	Detected results		Frequency of detection	Bkg value	Exceeds bkg	Industrial PRG for 10E-5 risk	Industrial PRG for HI = 1	Exceeds industrial PRG (risk and/or HI)
	Minimum	Maximum						
0- to 2-ft depth								
Metals (mg/kg)								
Arsenic	1.60E+00	7.80E+01	118/120	31	**8/120**	38.1	NA	**6/120**
Barium	2.90E+00	1.99E+02	117/117	181	**1/139**	NA	355,000	0/117
Beryllium	2.30E-01	2.20E+00	54/101	1.4	**4/101**	NA	3,940	0/101
Cadmium	2.00E-01	4.94E+03	53/118	2	**4/118**	NA	1,970	**1/118**
Chromium	1.30E+00	7.00E+01	138/139	28.6	**12/139**	113	NA	0/139
Cobalt	1.30E+00	5.60E+01	95/95	28.2	**2/95**	NA	602	0/95
Copper	3.20E+00	3.50E+01	95/95	32.6	**1/95**	NA	81,800	0/95
Lead	4.90E+00	1.50E+02	117/117	32	**4/117**	NA	800	0/117
Mercury (inorganic salts)	2.20E-02	3.50E+00	57/113	0.048	**31/113**	NA	611	0/113
Nickel	4.40E+00	2.57E+02	112/117	34	**12/117**	NA	37,700	0/117
Silver	1.70E-01	4.60E+00	44/109	2.5	**3/109**	NA	10,200	0/109
Uranium	6.10E-01	6.60E+01	121/121	4.8	**32/121**	NA	6,110	0/121
Vanadium	3.80E+00	4.30E+01	95/95	50.2	0/95	NA	18,400	0/95
Zinc	9.10E+00	4.80E+02	109/110	101	**10/110**	NA	613,000	0/110
Radionuclides (pCi/g)								
Technetium-99	0.00E+00	3.40E+00	37/123	NA	NA	17,100	NA	0/123
PCBs (mg/kg)								
Aroclor-1254	8.50E-02	1.20E+00	10/93	NA	NA	NA	40.9	0/93
Aroclor-1260	9.10E-02	1.00E+00	6/93	NA	NA	28.6	NA	0/93
Semivolatiles (mg/kg)								
Acenaphthene	NA	9.70E-01	1/75	NA	NA	NA	8,180	NA
Acenaphthylene	NA	4.50E-01	1/75	NA	NA	NA	8,180	0/75
Anthracene	8.90E-01	3.80E+00	4/75	NA	NA	NA	8,180	0/75
Benz(a)anthracene	3.50E-01	7.60E+00	8/75	NA	NA	7.84	NA	0/75
Benzo(b)fluoranthene	3.30E-01	7.60E+00	9/75	NA	NA	7.84	NA	0/75

Table 7. Soil Contaminant Screening at Study Area B (Continued)

Analysis	Detected results Minimum	Detected results Maximum	Frequency of detection	Bkg value	Exceeds bkg	Industrial PRG for 10E-5 risk	Industrial PRG for HI = 1	Exceeds industrial PRG (risk and/or HI)
0- to 2-ft depth (continued)								
Semivolatiles (mg/kg) (continued)								
Benzo(g,h,i)perylene	9.10E-01	3.20E+00	4/75	NA	NA	NA	8,180	0/75
Benzo(a)pyrene	3.50E-01	8.56E+01	8/75	NA	NA	7.84	NA	**1/75**
Benzo(k)fluoranthene	3.90E-01	3.60E+00	6/75	NA	NA	7.84	NA	0/75
Chrysene	3.50E-01	7.80E+00	10/75	NA	NA	7.84	NA	0/75
Dibenz(a,h)anthracene	NA	4.10E-01	1/75	NA	NA	7.84	NA	0/75
Dibenzofuran	NA	2.40E+00	1/75	NA	NA	NA	2,040	0/75
Fluoranthene	3.70E-01	3.00E+01	16/75	NA	NA	NA	8,180	0/75
Fluorene	NA	1.60E+00	1/75	NA	NA	NA	8,180	0/75
Indeno(1,2,3-cd)pyrene	8.50E-01	3.00E+00	4/75	NA	NA	7.84	NA	0/75
Methylene Chloride	2.00E-03	9.40E-02	9/89	NA	NA	717	NA	0/89
Phenanthrene	3.30E-01	3.10E+01	10/75	NA	NA	NA	NA	NA
Pyrene	3.80E-01	1.50E+01	14/75	NA	NA	NA	8,180	0/75
Volatiles (mg/kg)								
Trichloroethene	2.00E-03	2.00E-03	2/103	NA	NA	182	NA	0/103
1,1,1-Trichloroethane	2.00E-03	8.10E-03	3/89	NA	NA	NA	48,800	0/89
Toluene	2.00E-03	2.00E-03	2/83	NA	NA	NA	72,100	0/83
2- to 10-ft depth								
Metals (mg/kg)								
Arsenic	2.20E+00	2.20E+02	47/49	31	**9/49**	38.1	NA	**5/49**
Barium	1.40E+01	4.50E+02	28/28	181	**2/28**	NA	355,000	0/28
Beryllium	6.50E-01	1.60E+00	22/34	1.4	**1/34**	NA	3,940	0/34
Cadmium	2.60E-01	3.80E+00	11/28	2	**4/28**	NA	1,970	0/28
Chromium	4.00E+00	1.00E+02	79/79	28.6	**4/79**	113	NA	0/79
Cobalt	2.10E+00	5.60E+01	28/28	28.2	**2/28**	NA	602	0/28
Copper	4.30E+00	8.70E+01	28/28	32.6	**3/28**	NA	81,800	0/28

Table 7. Soil Contaminant Screening at Study Area B (Continued)

Analysis	Detected results Minimum	Detected results Maximum	Frequency of detection	Bkg value	Exceeds bkg	Industrial PRG for 10E-5 risk	Industrial PRG for HI = 1	Exceeds industrial PRG (risk and/or HI)
2- to 10-ft depth (continued)								
Metals (mg/kg) (continued)								
Lead	3.30E+00	4.90E+01	28/28	32	**2/28**	NA	800	0/28
Mercury (inorganic salts)	4.30E-02	3.10E-01	5/28	0.048	**4/28**	NA	611	0/28
Nickel	5.70E+00	1.10E+02	27/28	34	**12/28**	NA	37,700	0/28
Silver	3.90E-01	7.50E+00	2/28	2.5	**1/28**	NA	10,200	0/28
Uranium	1.90E+00	3.52E+02	83/83	4.8	**20/83**	NA	6,110	0/83
Vanadium	6.20E+00	1.30E+03	28/28	50.2	**2/28**	NA	18,400	0/28
Zinc	2.50E+01	2.10E+03	69/79	101	**11/79**	NA	613,000	0/79
Radionuclides (pCi/g)								
Technetium-99	ND	ND	0/81	NA	NA	17,100	NA	0/81
PCBs (mg/kg)								
Aroclor-1254	1.00E-01	3.20E-01	3/49	NA	NA	NA	40.9	0/49
Aroclor-1260	1.30E-01	1.60E-01	3/49	NA	NA	28.6	NA	0/49
Semivolatiles (mg/kg)								
Acenaphthene	NA	9.50E-01	1/53	NA	NA	NA	8,180	NA
Anthracene	4.00E-01	1.80E+00	3/53	NA	NA	NA	8,180	0/53
Benz(a)anthracene	8.70E-01	4.10E+00	4/53	NA	NA	7.84	NA	0/53
Benzo(b)fluoranthene	4.50E-01	4.60E+00	6/53	NA	NA	7.84	NA	0/53
Benzo(g,h,i)perylene	4.20E-01	1.20E+00	4/53	NA	NA	NA	8,180	0/53
Benzo(a)pyrene	6.50E-01	3.30E+00	4/53	NA	NA	7.84	NA	0/53
Benzo(k)fluoranthene	3.80E-01	1.80E+00	4/53	NA	NA	7.84	NA	0/53
Chrysene	4.30E-01	4.00E+00	7/53	NA	NA	7.84	NA	0/53
Dibenz(a,h)anthracene	NA	3.70E-01	1/53	NA	NA	7.84	NA	0/53
Dibenzofuran	NA	5.50E-01	1/53	NA	NA	NA	2,040	0/53
Fluoranthene	5.90E-01	8.10E+00	8/53	NA	NA	NA	8,180	0/53
Fluorene	NA	9.70E-01	1/53	NA	NA	NA	8,180	0/53

Table 7. Soil Contaminant Screening at Study Area B (Continued)

Analysis	Detected results		Frequency of detection	Bkg value	Exceeds bkg	Industrial PRG for 10E-5 risk	Industrial PRG for HI = 1	Exceeds industrial PRG (risk and/or HI)
	Minimum	Maximum						
2- to 10-ft depth (continued)								
Semivolatiles (mg/kg) (continued)								
Indeno(1,2,3-cd)pyrene	3.80E-01	1.20E+00	4/53	NA	NA	7.84	NA	0/53
Methylene Chloride	6.60E-03	1.00E-02	3/38	NA	NA	717	NA	0/38
Phenanthrene	4.90E-01	6.80E+00	7/53	NA	NA	NA	NA	NA
Pyrene	5.40E-01	8.70E+00	8/53	NA	NA	NA	8,180	0/53
Volatiles (mg/kg)								
Trichloroethene	NA	9.80E-03	1/38	NA	NA	182	NA	0/38
Toluene	NA	7.90E-02	1/36	NA	NA	NA	72,100	0/36

Notes:
1. **Bolding** indicates screening criteria have been exceeded.
2. Bkg values are from *Background Sampling Investigation of Soil and Groundwater Final Report for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE 1996b).
3. PRGs are for the industrial worker and were taken from the PORTS risk methods document (DOE 2011 [Draft]).
4. PRG for chromium is for VI (sample results were not speciated).
5. PRG for lead from EPA OSWER Directive 9355.4-12 (EPA 1994).

Bkg = background
DOE = U.S. Department of Energy
EPA = U. S. Environmental Protection Agency
HI = hazard index
NA = not applicable
ND = not detected
OSWER = Office of Solid Waste and Emergency Response
PORTS = Portsmouth Gaseous Diffusion Plant
PRG = preliminary remediation goal

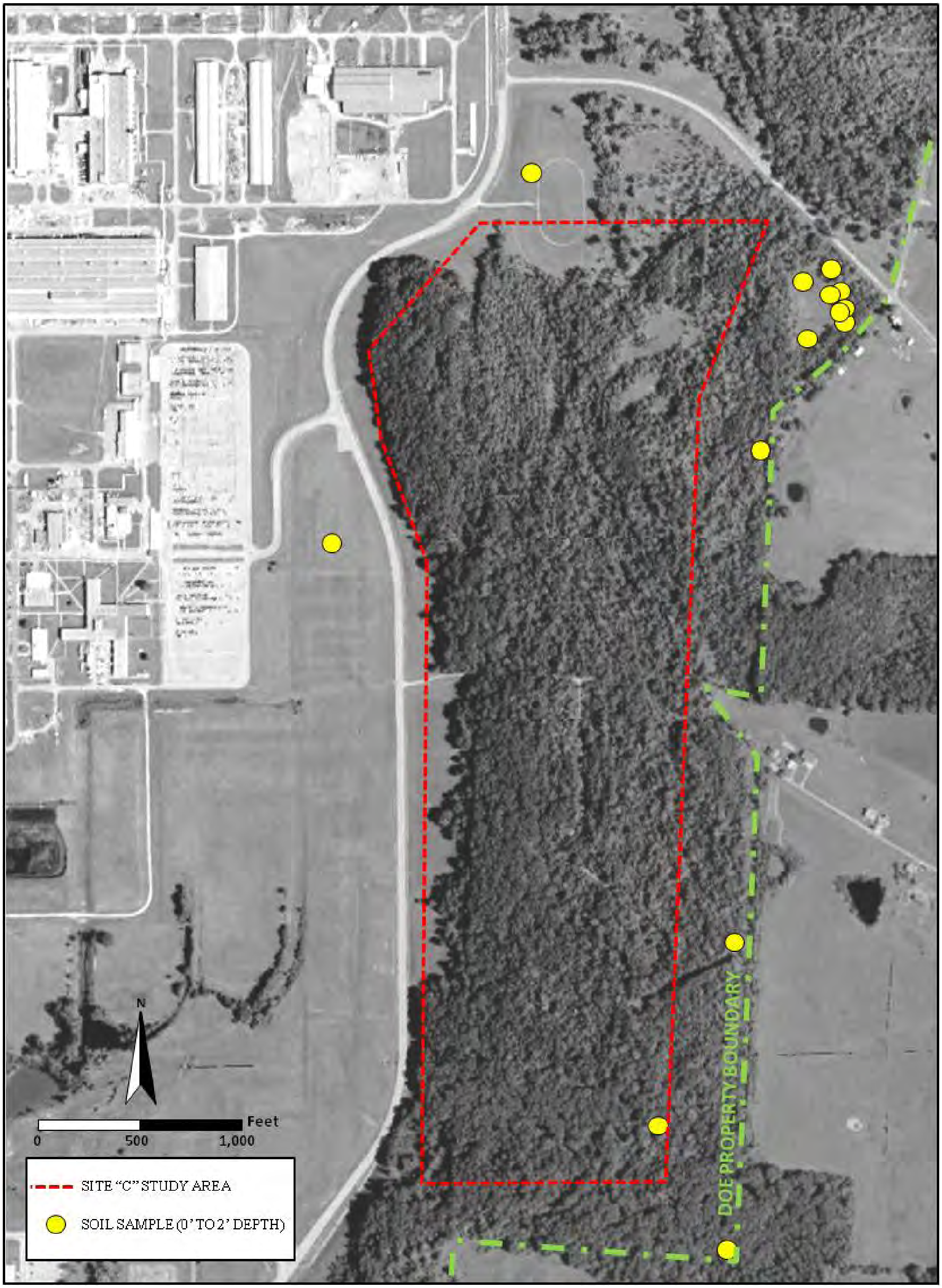

Figure 12. Locations of Soil Samples Collected from 0- to 2-ft Depth in Study Area C at PORTS

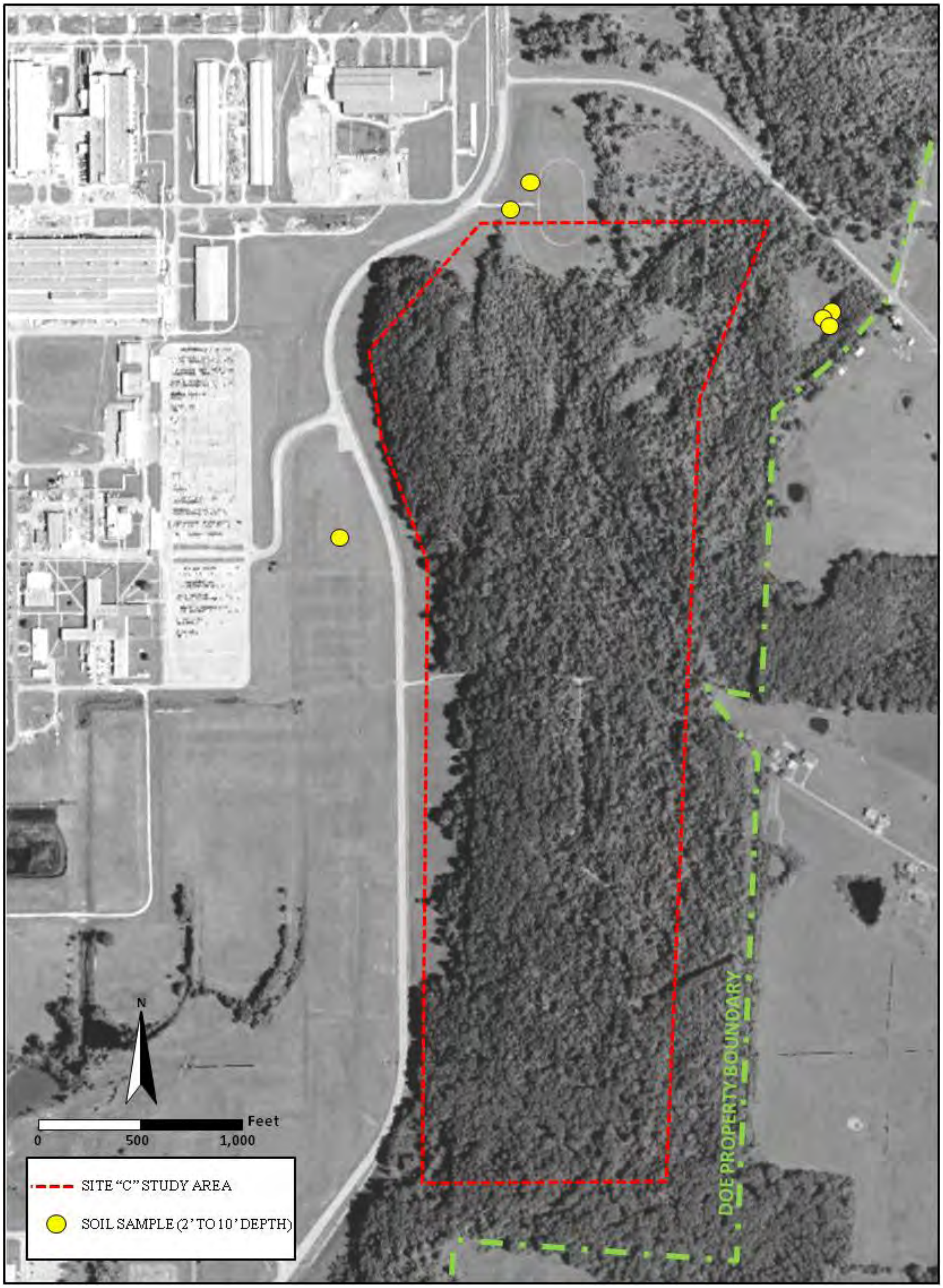

Figure 13. Locations of Soil Samples Collected from 2- to 10-ft Depth in Study Area C at PORTS

Table 8. Soil Contaminant Screening at Study Area C

Analysis	Detected results		Frequency of detection	Bkg value	Exceeds bkg	Industrial PRG for 10E-5 risk	Industrial PRG for HI = 1	Exceeds industrial PRG (risk and/or HI)
	Minimum	Maximum						
0- to 2-ft depth								
Metals (mg/kg)								
Arsenic	1.50E+00	2.50E+01	9/10	31	0/10	38.1	NA	0/10
Barium	3.80E+01	1.30E+02	10/10	181	0/10	NA	355,000	0/10
Beryllium	5.90E-01	1.20E+00	5/10	1.4	0/10	NA	3,940	0/10
Cadmium	6.30E-01	1.20E+00	9/10	2	0/10	NA	1,970	0/10
Chromium	7.50E+00	1.70E+01	10/10	28.6	0/10	113	NA	0/10
Cobalt	3.70E+00	5.40E+01	10/10	28.2	**2/10**	NA	602	0/10
Copper	5.80E+00	3.10E+01	10/10	32.6	0/10	NA	81,800	0/10
Lead	8.70E+00	2.00E+01	10/10	32	0/10	NA	800	0/10
Mercury (inorganic salts)	3.00E-02	7.10E-02	5/10	0.048	**2/10**	NA	611	0/10
Nickel	5.80E+00	5.90E+01	10/10	34	**2/10**	NA	37,700	0/10
Silver	4.90E+00	5.30E+00	2/10	2.5	**2/10**	NA	10,200	0/10
Uranium	2.60E+00	3.60E+00	10/10	4.8	0/10	NA	6,110	0/10
Vanadium	2.00E+01	4.10E+01	10/10	50.2	0/10	NA	18,400	0/10
Zinc	1.60E+01	1.30E+02	10/10	101	**2/10**	NA	613,000	0/10
Radionuclides (pCi/g)								
Technetium-99	NA	2.00E-01	1/10	NA	NA	17,100	NA	0/10
2- to 10-ft depth								
Metals (mg/kg)								
Arsenic	5.30E+00	1.20E+01	2/2	31	0/2	38.1	NA	0/2
Barium	1.00E-02	1.80E+02	6/6	181	0/6	NA	355,000	0/6
Beryllium	1.00E-02	1.10E+00	6/6	1.4	0/6	NA	3,940	0/6
Cadmium	1.00E-02	1.00E-02	4/6	2	0/6	NA	1,970	0/6
Chromium	3.60E-01	2.60E+01	6/6	28.6	0/6	113	NA	0/6
Cobalt	7.00E-02	2.00E+01	6/6	28.2	0/6	NA	602	0/6
Copper	5.20E-01	2.60E+01	6/6	32.6	0/6	NA	81,800	0/6

Table 8. Soil Contaminant Screening at Study Area C (Continued)

Analysis	Detected results: Minimum	Detected results: Maximum	Frequency of detection	Bkg value	Exceeds bkg	Industrial PRG for 10E-5 risk	Industrial PRG for HI = 1	Exceeds industrial PRG (risk and/or HI)
2- to 10-ft depth (continued)								
Metals (mg/kg) (continued)								
Lead	1.00E-02	2.00E+01	6/6	32	0/6	NA	800	0/6
Mercury (inorganic salts)	1.00E-02	3.30E-02	5/6	0.048	0/6	NA	611	0/6
Nickel	1.00E-02	5.50E+01	6/6	34	**1/6**	NA	37,700	0/6
Silver	5.00E-02	1.30E-01	4/6	2.5	0/6	NA	10,200	0/6
Uranium	NA	3.70E+00	1/1	4.8	0/1	NA	6,110	0/1
Vanadium	1.00E-02	3.90E+01	6/6	50.2	0/6	NA	18,400	0/6
Zinc	5.10E-01	8.50E+01	5/5	101	0/5	NA	613,000	0/5
Radionuclides (pCi/g)								
Technetium-99	NA	ND	0/1	NA	NA	17,100	NA	0/1
Volatiles (mg/kg)								
Trichloroethene	1.00E-02	1.00E-02	4/10	NA	NA	182	NA	0/10
1,1,1-Trichloroethane	1.00E-02	1.00E-02	4/9	NA	NA	NA	48,800	0/9

Notes:
1. **Bolding** indicates screening criteria have been exceeded.
2. Bkg values are from *Background Sampling Investigation of Soil and Groundwater Final Report for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE 1996b).
3. PRGs are for the industrial worker and were taken from the PORTS risk methods document (DOE 2011 [Draft]).
4. PRG for chromium is for VI (sample results were not speciated).
5. PRG for lead from EPA OSWER Directive 9355.4-12 (EPA 1994).

Bkg = background
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
HI = hazard index
NA = not applicable
ND = not detected
OSWER = Office of Solid Waste and Emergency Response
PORTS = Portsmouth Gaseous Diffusion Plant
PRG = preliminary remediation goal

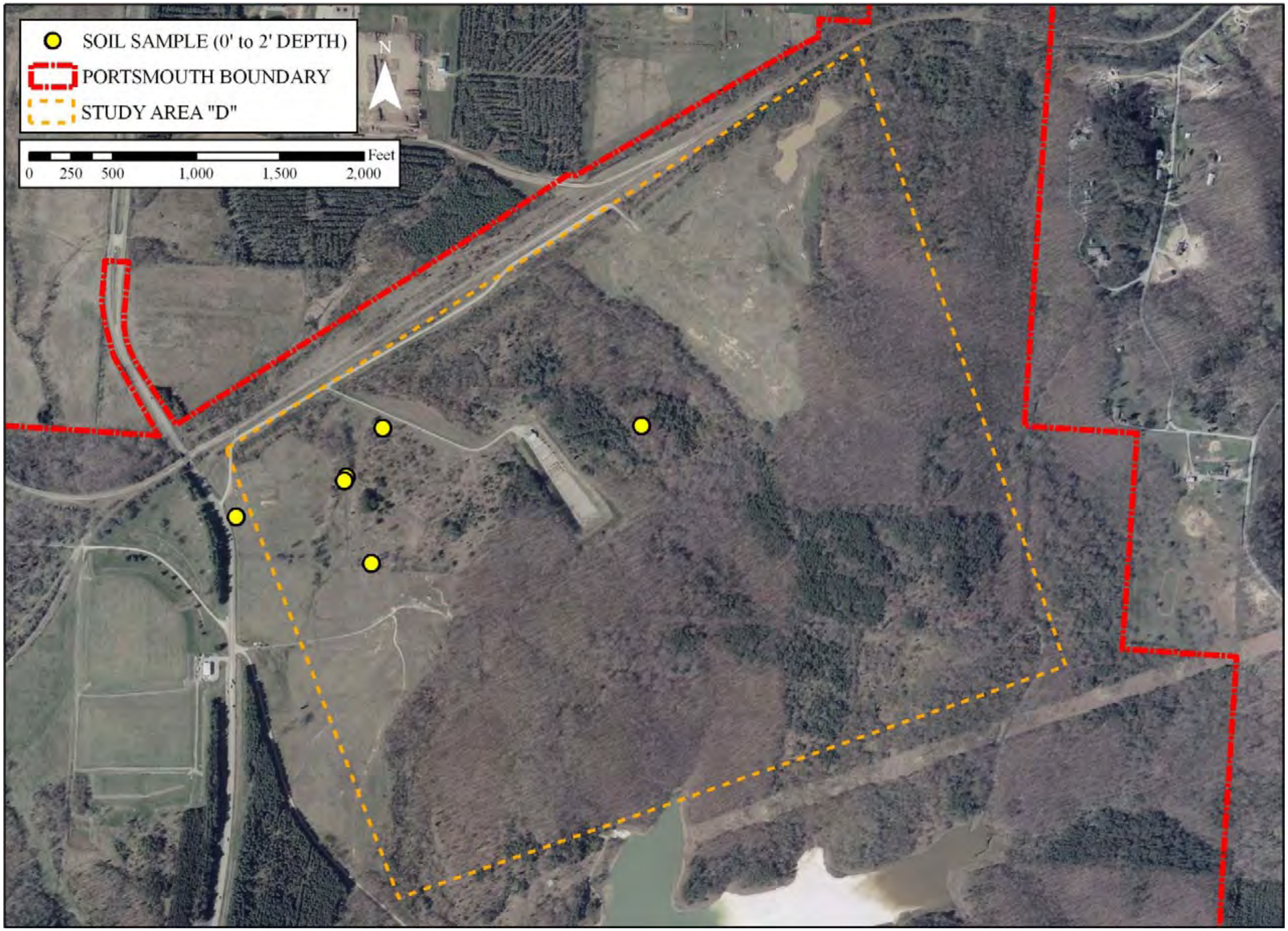

Figure 14. Locations of Soil Samples Collected in Study Area D at PORTS

Table 9. Soil Contaminant Screening at Study Area D

Analysis	Detected results		Frequency of detection	Bkg value	Exceeds bkg	Industrial PRG for 10E-5 risk	Industrial PRG for HI = 1	Exceeds industrial PRG (risk and/or HI)
	Minimum	Maximum						
0- to 2-ft depth								
Metals (mg/kg)								
Arsenic	1.61E+01	5.15E+01	5/10	31	**3/10**	38.1	NA	0/10
Barium	6.80E+00	8.55E+01	10/10	181	0/10	NA	355,000	0/10
Beryllium	8.00E-02	8.00E-02	1/10	1.4	0/10	NA	3,940	0/10
Cadmium	ND	ND	0/10	2	0/10	NA	1,970	0/10
Chromium	9.90E+00	5.97E+01	10/10	28.6	**3/10**	113	NA	0/10
Cobalt	2.50E+00	6.20E+00	4/10	28.2	0/10	NA	602	0/10
Copper	1.40E+00	1.19E+01	9/10	32.6	0/10	NA	81,800	0/10
Lead	8.00E+00	3.04E+01	6/10	32	0/10	NA	800	0/10
Mercury (inorganic salts)	2.50E-02	2.90E-02	10/10	0.048	0/10	NA	611	0/10
Nickel	1.06E+01	3.04E+01	10/10	34	0/10	NA	37,700	0/10
Silver	5.50E-01	5.50E-01	1/10	2.5	0/10	NA	10,200	0/10
Uranium	1.66E+00	5.52E+00	80/80	4.8	**2/80**	NA	6,110	0/80
Vanadium	5.80E+00	6.10E+01	10/10	50.2	**2/10**	NA	18,400	0/10
Zinc	7.90E+00	1.14E+02	10/10	101	**1/10**	NA	613,000	0/10
Radionuclides (pCi/g)								
Technetium-99	< 2.00E-01	4.00E-01	10/10	NA	NA	17,100	NA	NA

Notes:
1. **Bolding** indicates screening criteria have been exceeded.
2. Bkg values are from *Background Sampling Investigation of Soil and Groundwater Final Report for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE 1996b).
3. PRGs are for the industrial worker and were taken from the PORTS risk methods document (DOE 2011 [Draft]).
4. PRG for chromium is for VI (sample results were not speciated).
5. PRG for lead from EPA OSWER Directive 9355.4-12 (EPA 1994).

Bkg = background
HI = hazard index
NA = not applicable
ND = not detected
PRG = preliminary remediation goal

Information on the geochemical properties of the D&D waste is limited. Additional data collection will be needed to better define the nature of contaminants and geochemical properties of the potential D&D waste.

1.3 DEFINITION OF PROBLEM

Data regarding the implementability, effectiveness, and cost of disposal alternatives are needed to evaluate the disposal alternatives for up to 3 million cy of waste from PORTS D&D activities and waste from RCRA corrective action activities that might be disposed in a potential OSDC. Consent Decree/Administrative Consent Order waste cannot be disposed of in an OSDC without DOE obtaining the appropriate authorization and/or exemptions from Ohio EPA if such waste would have to meet the Ohio EPA approved WAC. The problem is addressed by the following two statements from the DFF&O (Attachment A, Appendix B):

- Whether sufficient data exist regarding the nature and amount of waste anticipated to be generated over the life of the PORTS project, including 1) waste anticipated to be generated during D&D activities under the consensual DFF&O, and 2) potential waste streams associated with environmental media cleanup activities to be conducted under the RCRA Consent Decree to support evaluation of sitewide waste disposition alternatives and strategies

- Whether sufficient data exist to support the evaluation of potential sitewide waste disposal alternatives and strategies, including evaluation of potential on-site waste disposition alternatives (e.g., geophysical, hydrological, and groundwater data to support evaluation regarding the existence of suitable candidate sites, data to support development of preliminary WAC, etc.).

The second problem statement is reiterated in the data quality objectives (DQOs) in Section 3.3 of this work plan.

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2. PROJECT ORGANIZATION AND RESPONSIBILITIES

This section describes the organization and management structure to be used in implementing the Sitewide Waste Disposition Evaluation RI/FS project. A D&D contract with Fluor-B&W Portsmouth, LLC (FBP) has been implemented at PORTS to manage D&D and environmental remediation activities. Under the current FBP organization structure, the Sitewide Waste Disposition Evaluation RI/FS project activities fall under the Environmental Remediation Manager. The project organization chart (Figure 15) illustrates the management structure that will be used, key management and technical positions required to complete the RI/FS, and relationships among the positions. The responsibilities of the project positions are described in Sections 2.1 through 2.8 of this work plan.

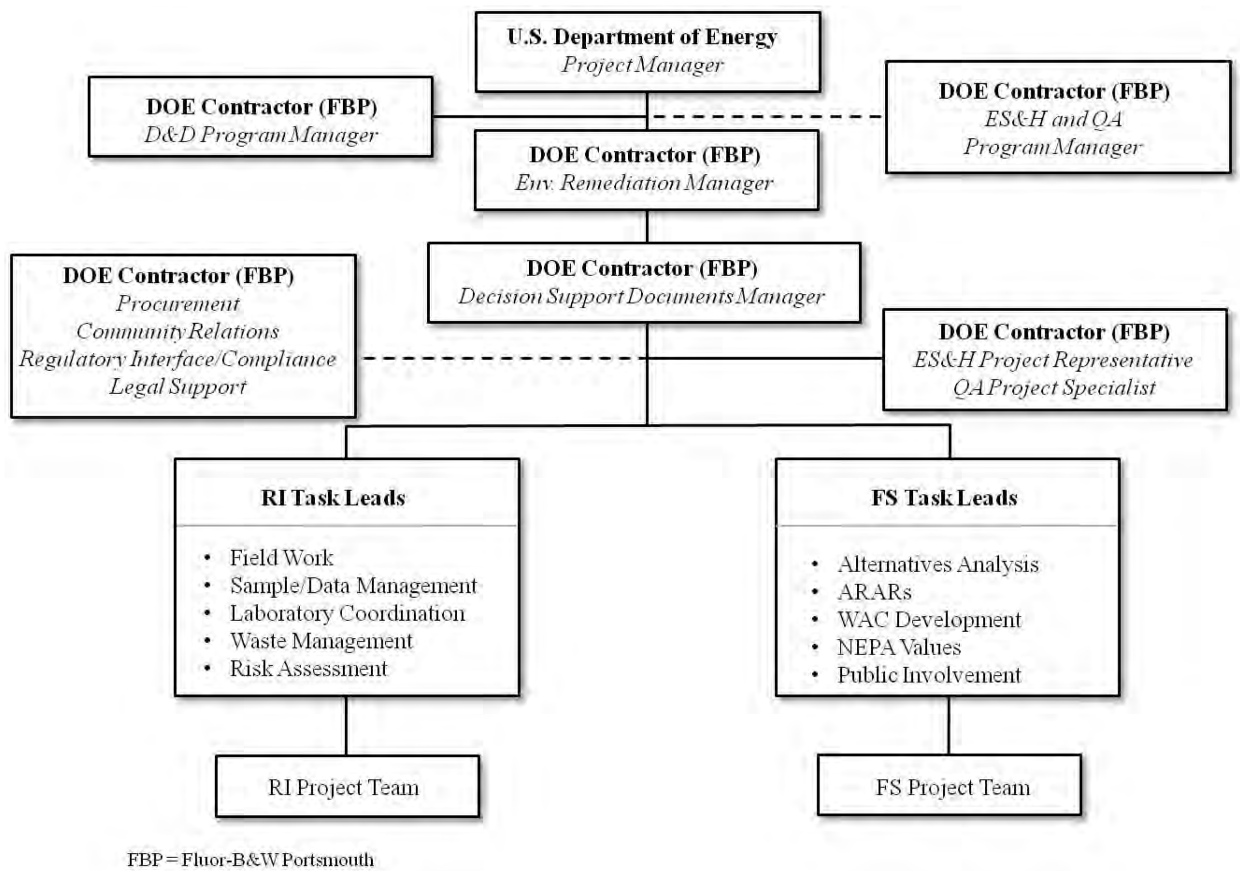

Figure 15. PORTS Sitewide Waste Disposition Evaluation RI/FS Project Organization Chart

2.1 DOE PROJECT MANAGER

The DOE Project Manager (PM) will provide overall management and technical oversight for the Sitewide Waste Disposition Evaluation RI/FS. This individual will be the primary interface between Ohio EPA and the D&D Program Manager. The DOE PM ensures appropriate DOE resources are available to provide adequate technical oversight and maintain project schedules.

2.2 FBP ENVIRONMENTAL REMEDIATION MANAGER

The FBP Environmental Remediation Manager will have overall programmatic responsibility for technical, financial, and scheduling matters related to the project, and will ensure appropriate resources

are available to facilitate completion of the RI/FS in a timely and efficient manner. This individual will monitor RI/FS team performance throughout the project.

2.3 DECISION SUPPORT DOCUMENTS MANAGER

The Decision Support Documents Manager will have overall responsibility for implementation of the RI/FS for the Sitewide Waste Disposition Evaluation project. This individual will be responsible for implementing the investigation as well as all plans and activities conducted as part of the RI/FS, including monitoring the work plan implementation and sampling and waste management activities. This individual will serve as the RI/FS lead and principal point of contact. The Decision Support Documents Manager will coordinate with other FBP functions (e.g., procurement, regulatory compliance, community relations, and legal) in implementation of the project.

This manager will track the project budget and schedules and delegate specific responsibilities to project team members. This individual is responsible for the preparation of any field change orders.

2.4 ENVIRONMENTAL SAFETY AND HEALTH REPRESENTATIVE

The Environmental Safety and Health Representative will guide implementation of the health and safety (H&S) program for the various Sitewide Waste Disposition Evaluation RI/FS tasks. Throughout the RI/FS work, this individual will ensure project personnel are properly trained in H&S, routinely evaluate the effectiveness of the H&S program, and revise the program as needed to ensure worker H&S. In addition, this individual will provide site-specific Health and Safety Plans (HASPs), expertise, and training whenever hands-on fieldwork is to be performed under the RI/FS.

2.5 QUALITY ASSURANCE PROJECT SPECIALIST

The QA Project Specialist will develop, approve, and maintain the QA Project Plan (QAPP) and associated QA/quality control requirements for the Sitewide Waste Disposition Evaluation RI/FS. In addition, the QA Manager will coordinate implementation of the QAPP, monitor compliance with quality requirements, and ensure the institution of any corrective actions necessary to maintain a high level of quality. This individual will provide the specific support necessary to resolve any quality issues that arise during the project. This individual may conduct audits and surveillances and approve any field changes that may impact project quality.

2.6 RI TASK LEADS

The RI Task Leads (Environmental Monitoring and Characterization Manager, Field PM, and Sample and Data Manager) will oversee and coordinate day-to-day activities associated with their assigned tasks to maintain the RI/FS on schedule. These individuals will interact with the Decision Support Documents Manager on a daily basis and will relay directions to RI/FS team members as necessary. The RI Task Leads will coordinate activities and exchange information necessary to ensure their assigned RI tasks are completed. These RI tasks will include fieldwork, sample collection and management, laboratory coordination, data management, management of investigation-derived waste (IDW), and risk assessment.

2.7 FS TASK LEADS

The FS Task Leads will oversee and coordinate day-to-day activities associated with their assigned tasks to keep the FS on schedule. These individuals will interact with the Decision Support Documents Manager on a daily basis and will relay directions to RI/FS team members as necessary. The FS Task Leads will coordinate activities and exchange information needed to ensure their assigned FS tasks are completed. These FS tasks will include the identification and analysis of waste disposition alternatives, meeting applicable ARARs, and development of WAC for a possible OSDC. In addition, these

individuals will ensure that National Environmental Policy Act of 1969 (NEPA) values are incorporated into the FS in accordance with DOE guidance.

2.8 RI/FS TEAM MEMBERS

The RI/FS team members will consist of the technical staff assigned to support completion of the RI/FS tasks and their associated activities. These team members will include geologists, engineers, environmental compliance specialists, waste management specialists, and field technicians. Subcontractor personnel will be retained as subject matter experts to complete specific technical activities such as drilling and civil surveying.

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3. PROJECT SCOPE AND OBJECTIVES

The scope of the Sitewide Waste Disposition Evaluation RI/FS is to gather information necessary to identify disposal alternatives for D&D waste generated at PORTS and to evaluate the identified alternatives. This information will be sufficient for DOE, Ohio EPA, and stakeholders to make informed decisions regarding selection of a preferred remedial alternative for waste disposition.

Ohio EPA entered into the DFF&O pursuant to Ohio's laws and regulations. DOE entered into the DFF&O pursuant to Section 104 of CERCLA, Executive Order 12580, and the Atomic Energy Act of 1954. The DFF&O uses the CERCLA process for activities conducted pursuant to the DFF&O. The DFF&O requires that the nine CERCLA criteria be used to evaluate remedial alternatives developed in and allows for consideration of NEPA values as part of the process. Under the Atomic Energy Act of 1954 (AEA), as amended, DOE has the authority to manage radioactive waste. DOE Order 435.1, *Radioactive Waste Management*, is the DOE directive that implements the AEA authority.

Waste disposal alternatives will be identified and evaluated during the FS. DOE will conduct a detailed analysis of these alternatives against the nine established CERCLA evaluation criteria as required by the DFF&O. These threshold, balancing, and modifying criteria are described in 40 *CFR* 300.430 (e)(9)(iii) and (f)(1)(i). The alternatives evaluated will be protective of human health and the environment and comply with ARARs identified for the alternatives. If the need for an ARAR waiver is identified, such waiver will be detailed in the RI/FS report (as reviewed by Ohio EPA), including how DOE intends to satisfy the applicable requirements of the DFF&O and 42 U.S.C. Section 9621 and 40 CFR Section 300.430. In addition, the scope of the Sitewide Waste Disposition Evaluation RI/FS will include completion of the major project tasks discussed in Section 3.1 of this work plan.

The primary objectives of the Sitewide Waste Disposition Evaluation RI/FS are as follows:

- Implement the RI/FS phase of the DFF&O response process for disposition of D&D waste generated at PORTS, which will consider the appropriate packaging and transportation of waste to the disposal site

- Collect the technical information and data necessary to identify and analyze waste disposition alternatives for D&D waste generated at PORTS

- Comparatively analyze the identified waste disposition alternatives and the no action alternative to determine the preferred alternative remedy for disposition of D&D waste generated at PORTS

- Communicate fully with stakeholders and the general public throughout planning and implementation of the RI/FS process for disposition of D&D waste at PORTS.

After completion of the RI/FS, a proposed plan (PP) will be prepared that will identify the preferred waste disposal alternative and provide a concise summary of the detailed alternatives analysis process described in the RI/FS report. The PP will furnish stakeholders and the general public with the essential RI/FS findings and conclusions, and will present a preferred alternative and will be issued for a formal public review and comment period. Following completion of the public review and comment period, DOE will issue a ROD that will identify the selected alternative for disposition of PORTS D&D and environmental media waste. This ROD also will contain a Responsiveness Summary providing responses to comments received during the public review and comment period.

3.1 TASK DESCRIPTION

This section identifies and describes the major tasks to be completed as part of the Sitewide Waste Disposition Evaluation RI/FS. Work on some of the tasks will be ongoing throughout the entire RI/FS. The RI tasks will be focused on gathering and analyzing information for use in completing the FS. Much of the information needed to support FS development is already available, as described in the PER. Some gaps in information needed to support the FS exist and are addressed in separate Sampling and Analysis Plans (SAPs). The FS tasks will focus on the identification of preliminary waste disposition alternatives and performance of a detailed analysis of waste disposition alternatives. Implementation of these tasks will follow, to the extent possible, *Guidance for Conducting Remedial Investigation and Feasibility Studies under CERCLA* (EPA 1988), unless the guidance is not appropriate for the specific scope of the project. This project will also follow the requirements in the DFF&O. The Sitewide Waste Disposition Evaluation PER addressed the status of each RI/FS task identified in the statement of work as required by the DFF&O.

The following RI/FS tasks will be conducted:

1) Project planning and scoping
2) Community relations
3) Field investigations
4) Treatability studies
5) Risk assessment
6) Remedial alternatives development and screening
7) Detailed analysis of remedial alternatives
8) RI/FS report

All tasks listed above are relevant to the Sitewide Waste Disposition Evaluation RI/FS project and will be addressed either in this RI/FS Work Plan or in the RI/FS report. Technical exchange meetings have been, and will continue to be, conducted between DOE and Ohio EPA throughout the process to present and evaluate information collected and determine future actions. The following sections describe the proposed activities within each task.

3.1.1 Project Planning and Scoping

The project planning and scoping task includes all efforts related to initiating the project and developing the PER and the RI/FS Work Plan. The purpose of project scoping is to define more specifically the appropriate type and extent of investigation and analysis that should be undertaken for the Sitewide Waste Disposition Evaluation project. This task includes several elements that are described in the following sections.

3.1.1.1 Conduct a project initiation meeting and site visit

Several meetings have been conducted prior to development of this work plan to better define the scope of the project and communicate with Ohio EPA. An initial site visit was conducted on November 10, 2009, and the official project initiation meeting was conducted May 25, 2010.

3.1.1.2 Establish and describe site conditions

Existing site data, primarily compiled from previous regulatory reports, have been collected and used to develop the site description provided in Section 3.1 of the Sitewide Waste Disposition Evaluation PER. This description, which is for the PORTS site in general, provides a summary of the site geology, hydrology, and hydrogeology. Other relevant background information on climatology, demography, and land use are also discussed.

3.1.1.3 Compile existing site data and develop a CSM

Existing data have been evaluated and are presented in various sections of this work plan. The description of existing data is found in Section 1.2 of this Work Plan. A preliminary CSM has been developed and was presented in Sections 3.4 and 3.5 of the Sitewide Waste Disposition Evaluation PER. The CSM is also summarized in Section 3.1.5 of this work plan. This CSM was developed to describe site conditions and identify release, transport, and exposure mechanisms and potential receptors to be addressed in the RI/FS evaluation.

3.1.1.4 Summarize potential threat to human health and the environment

A preliminary discussion of the potential threat to human health and the environment was provided in Sections 3.4 and 3.5 of the Sitewide Waste Disposition Evaluation PER. A description of the risk assessment approach is provided in Section 3.1.5 of this work plan.

3.1.1.5 Identify ARARs

The DFF&O mandates the initial identification of ARARs during the development of remedial alternatives. These ARARs are specific Federal/State requirements promulgated to protect human health and the environment, and may be chemical-specific, location-specific, or action-specific in nature. If no specific ARAR exists for a chemical, site location, or action, or if existing ARARs are not deemed sufficiently protective, then to-be-considered (TBC) guidance or advisory criteria may be identified and applied to ensure protection of human health and the environment. In the CERCLA process, which is reiterated in the DFF&O, ARARs and TBCs are used to (1) determine contaminant cleanup levels, (2) develop and refine remedial action alternatives, and (3) control implementation and operation of a selected remedial alternative.

Draft ARARs and TBCs have been identified for the preliminary remedial alternatives set forth in the Sitewide Waste Disposition Evaluation PER. The D&D DFF&O requires the ARARs in the work plan be consistent and at the same level (Part or Subpart level) as the ARARs identified in the PER. A preliminary discussion of ARARs is presented in Section 3.2 of this work plan as well as in Appendix B. The identification of ARARs and TBCs is an iterative process that will continue throughout the Sitewide Waste Disposition Evaluation RI/FS, which is consistent with the PER outline (Appendix A, Outline A-1, Section 4.3) in that "…the ARARs for the Site-Wide Waste Disposition Evaluation project will be further developed and refined during performance of the RI/FS as the potential remedial alternatives are defined and finalized. The refined list of ARARs will be included in the final RI/FS report." The draft list of identified ARARs and TBCs in this report likely will change as more information is obtained, the preferred alternative is identified, and the approach to remediation is refined. In the FS, an evaluation of the remedial alternatives will be performed to determine the ability of each to meet its respective ARARs and TBCs.

The RI/FS SOW in Appendix B of the DFF&O requires that the RI/FS Work Plan also identify ARARs and TBCs that apply to field activities to be performed during the RI/FS. The primary focus of fieldwork will be to collect geochemical and geotechnical sampling data related to siting and WAC development and process building data to support waste quantity and nature refinement. The ARARs and TBCs that apply to these types of activities are listed in the Appendix B tables under the headings of waste characterization, management, storage, treatment, and disposal.

3.1.1.6 Identify and fill information gaps

Identification of data needs and DQOs is an essential part of the RI/FS scoping or planning process. Much of the information needed to support the FS is already available in existing PORTS reference sources. During meetings in February and May 2010, and January 2011, the DQO process was used to

identify additional information and data sets needed to complete the FS. This process and the identified information gaps are discussed in Section 3.3 of this work plan. The detailed plans, field procedures, and laboratory methods necessary to collect the needed information for the RI phase are described in separate SAPs.

3.1.1.7 Prepare major project plans

Appropriate plans, such as SAPs, HASPs, and QAPPs, will be developed to support data collection activities identified in the RI/FS Work Plan. The SAPs, to be provided as separate documents, will provide the necessary documentation to enable defensible data collection as part of the Sitewide Waste Disposition Evaluation RI/FS. The HASPs will address the potential hazards and concerns associated with the waste types, field activities, decontamination procedures, and associated response procedures during implementation of the SAPs. The QAPPs will provide a blueprint to ensure the project produces reliable data that can be used to meet the overall objectives and goals.

3.1.1.8 Identification of Existing Obligations

There are several existing permits at Portsmouth, including but not limited to, an NPDES permit for the discharge of wastewater and a RCRA Part B permit for the storage of hazardous waste. Project activities subject to any of the existing permit(s) must continue to comply with such permits.

3.1.2 Community Relations

Community participation in the planning and implementation of the Sitewide Waste Disposition Evaluation RI/FS is an essential and required part of the overall DFF&O compliance process. DOE is also conducting community relations activities for PORTS in compliance with 40 *CFR* 300.430(c). These regulations require development of a Community Relations Plan (CRP) to inform the community about the D&D actions at PORTS and to solicit public participation in the decision process. A formal CRP has been developed and will be used to facilitate public participation in the Sitewide Waste Disposition Evaluation RI/FS. The Ohio EPA concurred with the CRP related to D&D activities at the site in July 2010.

DOE anticipates that public interest in this project will be high. Realizing the importance of seeking feedback from the general public, DOE plans to hold update meetings, poster sessions, and/or workshops to inform the community about the Sitewide Waste Disposition Evaluation RI/FS. Some of the key topics will include the following:

- Waste disposition evaluation
- Siting of a potential OSDC
- Design of a potential OSDC
- Recycling materials from D&D
- WAC for a potential OSDC

During these activities, stakeholders and the general public will have an opportunity to learn about and provide input to the RI/FS. These meetings and workshops will supplement standard public participation activities. Another information source will be the *Portsmouth Environmental Bulletin*. This periodic publication is distributed to more than 4,000 recipients, including those on the community relations mailing list, neighbors within 2 miles of the plant, plant employees, and plant retirees. In addition, members of the general public will be able to obtain RI/FS information and provide input to DOE through the existing PORTS Site Specific Advisory Board.

3.1.3 Field Investigations

All efforts related to fieldwork for the RI phase of the RI/FS are included in this task. Fieldwork is necessary to obtain sufficient data to satisfy the DQOs for the project. This work plan, in conjunction with the separate SAPs, has been developed to guide the field investigation. More detail on project fieldwork is found in Section 5 of this work plan.

Sampling and analytical methods will be based on applicable EPA, Ohio EPA, and DOE guidance, as well as guidance documents listed in Attachment C of the DFF&O and will be described in the SAPs. The SAPs will also describe the procedures to be used for implementing the fieldwork. Data reduction, validation, and reporting will be in accordance with the appropriate DQOs.

3.1.4 Treatability Studies

Treatability studies are conducted, as needed, to collect additional information necessary to evaluate the technologies identified during the development of alternatives. No treatability studies have been currently identified for this project.

3.1.5 Streamlined Risk Assessment

The overall purpose of risk assessment for the Sitewide Waste Disposition Evaluation project is to provide the information necessary to justify remedial action and support alternative development such that informed decisions can be as required by the DFF&O. As stated in risk assessment guidance for Superfund (EPA 1989), risk assessment includes characterizing the contaminants, potential exposures, and potentially exposed populations sufficiently to determine what risks need to be reduced or eliminated and what exposures need to be prevented.

For the Sitewide Waste Disposition Evaluation RI/FS, risk assessment will be used to determine if there is a threat to human health and the environment that warrants a remedial action, and to provide information necessary to evaluate and compare the alternatives developed to mitigate those threats. The first purpose is accomplished in the baseline risk assessment, including both human health and environmental components, presented in the RI report. The second purpose is accomplished in an assessment of long-term and short-term effectiveness of the remedial alternatives presented in the FS report.

As stated in EPA guidance, risk assessment is not intended to "fully characterize site risks or eliminate all uncertainty from the analysis." Thus, there is latitude in the risk assessment process to scale the level of effort commensurate with the complexity of the decision to be made. For the Sitewide Waste Disposition Evaluation RI/FS, a qualitative risk assessment process will be followed. This is a streamlined approach to evaluate risk to human health and the environment by using only limited quantitative data that is typically used in risk assessment. Because exposures occur only under a hypothetical future scenario, no data exists to conduct quantitative risk assessment. Thus, the risk evaluation will be a qualitative discussion of potential future site-related contaminants of potential concern (COPCs), contaminant transport mechanisms, potential future receptors, and potential future exposure pathways.

3.1.5.1 Human health risk assessment

The human health risk assessment will provide an evaluation of the potential threat to human health in the absence of any remedial action. The baseline risk assessment will be an evaluation of the no action alternative, which is defined as no demolition and no disposal. Degradation of the buildings allows for the unmitigated release of constituents from the buildings as they deteriorate, which allows for the transport of contaminants to where exposures may occur. This assessment will be conducted to qualitatively evaluate risk by developing the four components of a risk assessment, including contaminant identification, exposure assessment, toxicity assessment, and risk characterization as described in the

Methods for Conducting Human Health Risk Assessments and Risk Evaluations at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio, DOE/PPPO/03-0215&D2. Existing quantitative and qualitative human health risk assessments developed from PORTS may be used in establishing baseline conditions for the no action alternative for use in making remedial decisions. Such information may be obtained from the following documents as well as the RCRA Facility Investigations that were done for all four quadrants.

- *Facility Condition Survey of Portsmouth Gaseous Diffusion Plant Facilities*, Piketon, OH, Theta Pro2Serve Management Company LLC, August 2006 (TPMC 2006c)

- *Report for Environmental Audit Supporting Transition of the Gaseous Diffusion Plants to the United States Enrichment Corporation*, Appendix A, Volumes I and II: Portsmouth Sites/Facilities Reports, DOE, June 1993

- *Plant-wide Baseline Human Health Risk Assessment*, Portsmouth Gaseous Diffusion Plant, Piketon, OH, DOE/OR/11-1403/V1&D1, DOE, 1995.

Exposure scenarios to consider in the baseline risk assessment are presented in a CSM. A CSM illustrates the interrelatedness of these components (see Figure 16) from the source of contamination to the potential on-site and off-site receptors. The CSM provides additional details and preliminary analysis that will be further refined in the RI/FS.

Briefly, components of the qualitative human health risk assessment will include the following:

- Contaminant identification – Identification of COPCs that are currently in the buildings using process knowledge

- Exposure assessment – Identification of the potential on-site and off-site human receptors and assessment of the exposure pathways by which they could be in contact with the COPCs resulting in intake of constituents or radiological dose. The exposure pathways are shown in the CSM. The on-site and off-site receptors that will be evaluated are identified below:

    - On-site receptors:

      Resident – Although such an exposure scenario is not likely for PORTS, it provides an upper bound estimate of potential exposure

      On-site industrial worker - Site worker not involved in remediation activities

    - Off-site receptors:

      Resident – Considered to be located at an off-site location potentially impacted by migration of constituents from the site

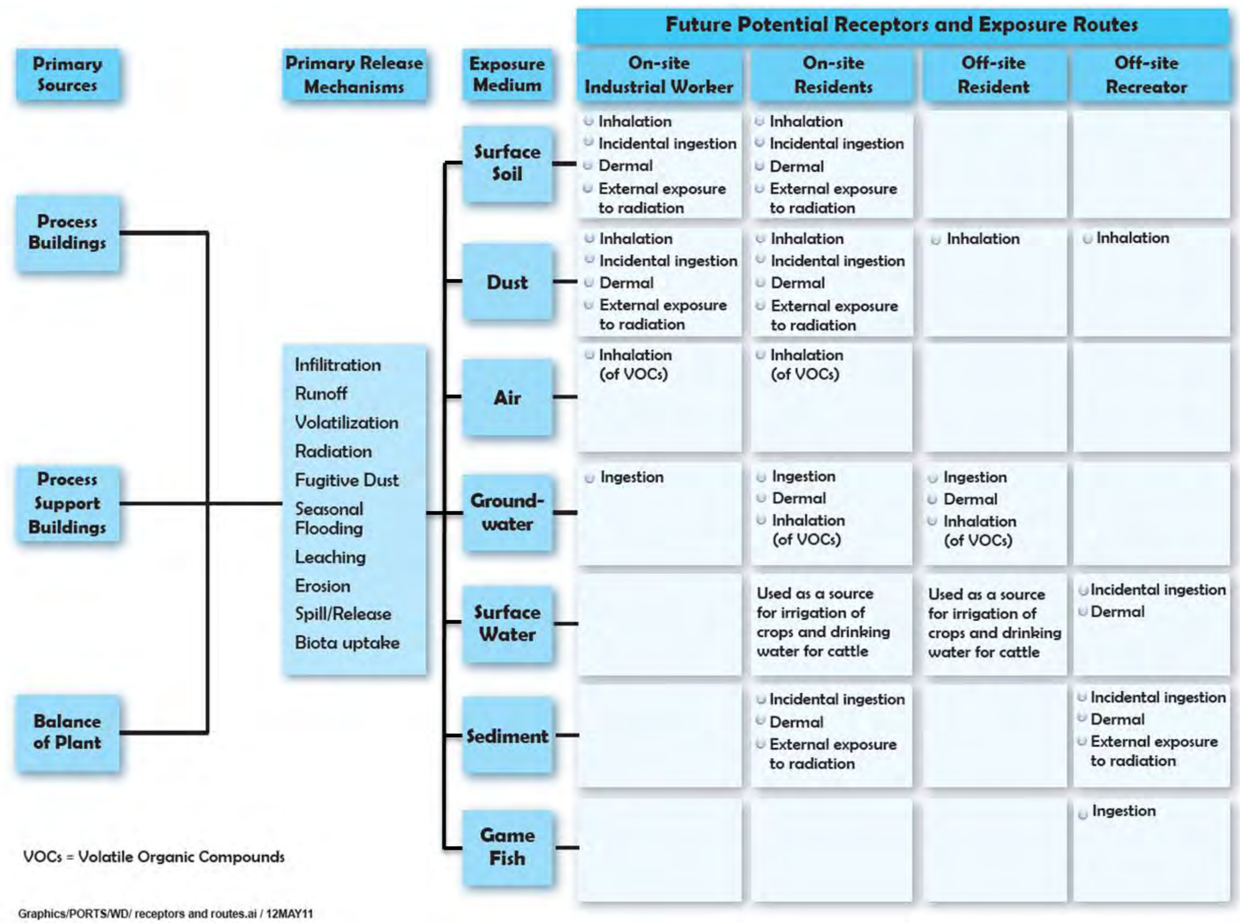

Figure 16. PORTS CSM for Human Receptors

Recreational User - Individuals who spend time in the vicinity of the site on an intermittent basis and could be exposed to contaminated surface water, dust, or biota

- Toxicity assessment – Identification of cancerous and non-cancerous toxicity attributes of the COPCs
- Risk characterization - Qualitative evaluation of potential risks and potential radiation doses associated with a completed exposure pathway.

3.1.5.2 Ecological approach

Under the no action baseline conditions, on-site and off-site ecological receptors may be susceptible to exposure from potential contaminants through contaminant migration via runoff or through ecological receptors inhabiting the building or located near degrading buildings. Under a contaminant migration scenario, runoff could move along the surface to a surface water body or to adjacent soil, or could infiltrate to groundwater and discharge to surface water. In either case, exposure to ecological receptors away from the site would occur once the contaminants migrated to a stream, river, or pond where flora and fauna could be exposed to contaminants through consumption and/or direct contact. Existing qualitative and quantitative ecological risk assessment information developed for PORTS may be used in establishing baseline conditions for the site. The following work will be considered:

- *Baseline Ecological Risk Assessment Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/OR/11-1316/D2, U. S. Department of Energy, June 1996

Existing ecological risk assessment conclusions from the above citation and from the RCRA Facility Investigations preliminary ecological risk assessments will be used to identify potential ecological receptors at Portsmouth. The *Methods for Conducting Ecological Risk Assessments and Ecological Risk Evaluations at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/PPPO/03-0215&D1, will be used as it applies to this project. Then, a qualitative identification of COPCs from process knowledge of the facilities will be used to identify the migration potential of contamination. Those contaminants that adhere to soil would be assumed to migrate via surface runoff but not through groundwater flow. Contaminants that are highly mobile would be assumed to migrate through the groundwater. Then, considering the distance to the receptor and the projected risk from contaminated media already assumed, the potential for increasing the risk from releases from the debris piles would be evaluated.

3.1.5.3 Alternatives evaluation

This section describes how the risk assessment will be used in the alternatives evaluation of the FS. The FS will assess each alternative against nine evaluation criteria. Two of these alternatives, short-term and long-term effectiveness, are risk-based evaluations. It should be noted that, by definition, alternatives that are carried forward from screening typically meet the threshold requirements of protection of human health and the environment.

Long-term effectiveness and permanence. The FS will evaluate the alternatives for their effectiveness in minimizing risk and/or hazard to human and ecological receptors after implementation of the alternative. The FS will qualitatively evaluate and compare the potential risks or hazards of the no action alternative (baseline risk assessment) with the long-term residual impacts that would occur after implementation of the on-site and off-site disposition alternatives. It will qualitatively assess the ability of the on-site and off-site disposition alternatives, respectively, to minimize and/or eliminate exposure pathways, which would reduce or eliminate long-term risk to human and ecological receptors, as well as the likely permanence for such reduction or elimination.

Short-term effectiveness. The FS will evaluate the alternatives for their effectiveness in minimizing risk to human and ecological receptors associated with actions undertaken as part of the implementation of the alternatives. The primary aspect of the short-term effectiveness evaluation will be a quantitative assessment of transportation risk, although impacts of other actions will be included. Transportation risk would exist for the on-site disposal alternative as a result of hauling material (e.g., clay, gravel, clean fill) to the site for construction and operation of a disposal cell, while risk for the off-site disposal alternative would exist as a result of shipping wastes to an approved off-site disposal facility.

Transportation risks for both the on-site and off-site disposal alternatives will be evaluated quantitatively through accident calculations. These calculations will use numbers of trips, distances to disposal locations, and the probability of an accident and/or fatality occurring. This calculation will be conducted for both truck and rail (or combinations of both, where necessary) transportation scenarios (DOE 2010b).

During transportation to an off-site waste disposal facility, there is the potential for off-site members of the public to be exposed. The assessment for this exposure will be a streamlined/qualitative evaluation that will account for and consider the short duration of potential exposures. For a potential OSDC, the exposures will be assessed for activities occurring during on-site transportation and placement of waste in such a cell, where there is a potential for dust to spread. Operating procedures and engineering controls

used to minimize and monitor contamination dispersion will be described and assessed for their effectiveness in reducing risk.

3.1.5.4 Risk assessment data needs

Receptors that will be evaluated in the RI/FS are summarized in Table 10, which illustrates both the qualitative and quantitative assessments. Quantitative evaluation will be used to assess transportation risk associated with both the on-site and off-site disposal options, while qualitative evaluations will be used for all other assessments of risk.

Table 10. Summary of the Human Health and Ecological Risk Assessment Approach for the PORTS Site

Type of assessment	Receptor location	Receptor
Qualitative	On site	Resident
	On site	General industrial worker
	On site	Ecological (aquatic and terrestrial)
	Off site	Resident
	Off site	Recreational user
	Off site	Ecological (aquatic and terrestrial)
Quantitative	Off site	Transportation risk[a]

[a]Based on anticipated truck and rail miles and U.S. Department of Transportation accident and injury estimates per mile.

PORTS = Portsmouth Gaseous Diffusion Plant

There is sufficient information in existing risk assessments performed for PORTS, as well as other regulatory documents, to conduct the streamlined risk assessment. The COPCs are identified through process knowledge, and the exposure pathways and receptors are identified in the CSM. Because the risk characterization will be qualitative, no additional data or information is needed beyond what is currently available to conduct an evaluation of the long-term effectiveness of alternatives in the FS.

For the short-term effectiveness evaluation, a quantitative transportation risk assessment will be conducted. The transportation-related aspects of the alternatives will need to be identified to perform accident estimates per miles driven. The total number of truck miles is needed based on the amount of waste material requiring disposal for the off-site alternative, while the total number of truck miles required to deliver materials to the site for construction of a potential OSDC will be needed. Additionally, other potential effects of actions developed as part of the action alternatives will be evaluated per the CSM for inclusion in the short-term effectiveness evaluation, as applicable.

Additional data are being collected for WAC development and siting evaluation that can be used in the assessment of long-term risk of a potential OSDC.

3.1.6 Remedial Alternatives Development and Screening

Existing and additional information collected during the RI will support the identification of remedial alternatives for waste disposition. The RI information will be used to further refine existing remedial action objectives (RAOs) and develop a WAC if an OSDC is evaluated as a remedial alternative. The following preliminary RAOs were identified in the PER (DOE 2010a):

- Prevent exposure to future generated D&D waste that exceeds a human health risk of 1×10^{-5} excess life-time cancer risk (ELCR) or a hazard index (HI) of 1 for 1,000 years

- Prevent releases (from on-site disposal) of future generated D&D waste that exceed a human health risk of 1×10^{-5} ELCR or an HI of 1

- Prevent ecological exposure to future generated D&D waste

- Facilitate timely cleanup of the PORTS site.

These RAOs will be re-evaluated and refined during the RI/FS as additional site characterization data and information become available. The refined RAOs will then be used to develop remedial alternatives, including the no action alternative. The Sitewide Waste Disposition Evaluation PER provides a preliminary discussion of the remedial action technologies, process options, and remedial alternatives. The discussion will be further expanded with a full evaluation of the remedial alternatives in the RI/FS report. Retained alternatives will be carried forward for detailed analysis in the FS.

A draft WAC will be presented in the FS. Appendix C of this work plan presents the results of developing a preliminary WAC. The preliminary WAC was used to understand key features of a WAC development process to support identification of data needs. Numerous comments received by Ohio EPA on the preliminary WAC process will be addressed through the process of developing a final WAC in accordance with the DFF&O.

The preliminary remedial alternatives to be evaluated include the following:

- The *No Action Alternative:* For the purpose of this evaluation, this alternative assumes no D&D and therefore no waste disposal. This alternative is the same as that for the process building no action alternative, which is leaving the buildings to degrade.

- The *On-site Alternative*, which involves disposal of the projected volume of anticipated PORTS D&D waste in an on-site engineered disposal facility designed, constructed, and operated to accept LLW, RCRA waste, TSCA waste, mixed waste (combinations of LLW, RCRA, and/or TSCA waste), and noncontaminated solid waste. Such a facility would only handle PORTS-generated waste that meets the approved WAC. The on-site disposal alternative has an off-site disposal component because waste that does not meet a WAC would need to be sent off site for disposal in a DOE-approved facility that is authorized to accept such wastes. This alternative also allows for material recycling. The evaluation of recycling will include potential siting, construction, operation, and D&D of the facilities to decontaminate, treat, size reduce, and/or package such materials. Because of the ability to request authorizations and exemptions under Ohio regulations to dispose of RCRA corrective action waste in a potential OSDC, this alternatives analysis includes consideration of the potential volume of waste that is anticipated to be generated during RCRA corrective actions at PORTS.

- The *Off-site Alternative*, which involves disposal of the projected volume of all anticipated PORTS D&D waste in off-site disposal facilities capable of accepting LLW, hazardous waste, TSCA waste, mixed waste (combinations of LLW, hazardous waste, and/or TSCA waste), and noncontaminated solid waste. This alternative also allows for material recycling.

3.1.7 Detailed Analysis of Remedial Alternatives

The alternatives that survive screening will be described and analyzed in detail in the FS, which will also include the no action alternative. Each alternative will be evaluated individually against the nine criteria (i.e., the two threshold, five balancing, and two modifying criteria) set forth in the National Oil and Hazardous Substances Pollution Contingency Plan. Appropriate NEPA values will also be considered within the context of the alternative evaluation, consistent with DOE policy.

3.1.8 RI/FS Report

Results of the Sitewide Waste Disposition Evaluation RI/FS will be documented in a written report. Preparation of more generalized sections of the report can begin relatively early in the RI/FS process, and writing will progress throughout the effort as more information becomes available. After all necessary information has been acquired and analyzed in the RI, it will be included in the disposal alternatives evaluation in the FS. After the FS evaluation, the RI/FS report will be completed. This report will describe the entire Sitewide Waste Disposition Evaluation RI/FS in detail.

3.2 FEDERAL, STATE, AND LOCAL ARARS AND TBCS

Regulations considered in identifying potential Federal and State ARARs and nonpromulgated advisories/guidance TBC that are anticipated to apply to waste management activities and waste facility operations being evaluated under the preliminary remedial alternatives are listed below in Sections 3.2.1 and 3.2.2. The DFF&O requires preliminary identification of ARARs and TBCs at the Part or Subpart level. Development of ARARs is an iterative process. Once the remedial alternatives are fully developed during performance of the Sitewide Waste Disposition Evaluation RI/FS, the lists of ARARs and TBCs will be further evaluated and developed (with revisions, additions, and deletions occurring), and finalized in the RI/FS submission. A draft list of ARARs for each alternative is provided in Appendix B.

Chemical-specific ARARs and TBCs are not identified at this stage because this action is not addressing cleanup decisions for contaminated environmental media. Any chemical-specific ARARs or TBCs identified during performance of the Sitewide Waste Disposition Evaluation RI/FS will be included in the detailed list of ARARs and TBCs that will be part of the final Sitewide Waste Disposition Evaluation RI/FS report.

These same ARARs and TBCs also apply to field activities to be performed during the RI/FS. The primary focus of fieldwork will be to collect geochemical and geotechnical sampling data related to siting and WAC development and process building data to support waste quantity and nature refinement. The ARARs and TBCs that apply to these types of activities are listed in the Appendix B tables under the headings of waste characterization, management, storage, treatment, and disposal.

3.2.1 Potential Location-specific ARARs and TBCs

A sitewide threatened and endangered species survey that was completed in 1996 identified a number of potentially suitable habitats at PORTS for Federal- and State of Ohio-listed, threatened, and endangered species, although only one State-listed plant species was actually observed (Lockheed Martin Energy Systems, Inc. [LMES] 1997). Other sensitive resources (e.g., wetlands, floodplains, and cultural resources) are also present. As part of the evaluation of alternatives, candidate sites for the on-site disposal alternative will be screened for sensitive resources. Any such resources identified at candidate sites will be protected in accordance with the substantive provisions of the following location-specific ARARs and TBCs, as appropriate:

<u>Endangered, threatened, and rare species</u>

Federal Endangered Species Act, 16 *United States Code* (*USC*) §1531 et seq.

State endangered and threatened wildlife and plants, *Ohio Revised Code* (*RC*) 1531, *RC* 1518, and *Ohio Administrative Code* (*OAC*) 1501

Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds"

Cultural resources

National Historic Preservation Act, 16 *USC* 470f and 36 *CFR* 800

Archeological and Historic Preservation Act, 16 *USC* 469

Native American Graves Protection and Repatriation Act, 25 *USC* 3002(d).

Aquatic resources, wetlands, and floodplains

Fish and Wildlife Coordination Act, 16 *USC* 662(a)

Clean Water Act of 1972 (CWA), Section 404(b), discharge of dredged or fill material, 40 *CFR* 230, Subpart H

CWA Nationwide Permit Program, 33 *CFR* 323

DOE compliance with floodplain/wetlands environmental review requirements, 10 *CFR* 1022

Protection of wetlands and mitigation of loss of wetlands, 40 *CFR* 230, Subpart J

3.2.2 Potential Action-specific ARARs and TBCs

No action alternative. Pursuant to EPA guidance, there are no ARARs for a no action alternative (Office of Solid Waste and Emergency Response Directive 9234.2-01FS-A [EPA 1991]).

*On-site disposal alternative***.** The action-specific ARARs and TBCs identified here address design, construction, operation, closure, and post-closure care for the preliminary on-site disposal alternative. It is anticipated that an OSDC would have some capability to treat waste to meet physical or chemical WAC. Specific treatment technologies will be evaluated further in the RI/FS. An OSDC would be responsible for any necessary treatment and/or off-site transport of wastes it generates during facility operations that could not meet the WAC for on-site disposal.

The requirements for a TSCA chemical waste landfill are described in 40 *CFR* 761.75 and would be potential ARARs. The TSCA chemical waste landfill design requirements generally follow the RCRA landfill design requirements. However, TSCA specifies that if a synthetic liner is used, it must have a minimum thickness of 30 mil. In addition, TSCA specifies that the bottom of the liner must be located 50 ft above the historical, high groundwater mark and must prohibit any hydrologic connection between the site and any surface water, 40 *CFR* 761.75(b)(3). If the need for an ARAR waiver is identified, such waiver will be detailed in the RI/FS report (as reviewed by Ohio EPA), including how DOE intends to satisfy the applicable requirements of the DFF&O and 42 U.S.C. Section 9621 and 40 CFR Section 300.430. For example, a waiver may be needed for the TSCA requirement that the bottom of a landfill liner be 50 ft above the historical, high groundwater table, depending on the candidate site. Study Area C

may be able to meet this requirement and would not need a waiver. Alternatively, WAC for the disposal facility could forbid disposal of TSCA waste in areas with insufficient depth to groundwater. In accordance with the DFF&O, the RI/FS will evaluate at least one alternative or sub-alternative that is fully ARAR compliant with no ARAR waived.

<u>Landfill siting and design criteria</u>

RCRA landfill location standards, 40 *CFR* 264.18 and *OAC* 3745-54-18(A)(1)

RCRA landfill design requirements, 40 *CFR* 264, Subpart N

Hazardous waste facility siting criteria, *RC* 3734.05(D)(2)

TSCA hydrologic siting requirements, 40 *CFR* 761.75(b)

Land disposal of radioactive waste (site selection, design, and assessment), DOE Manual 435.1-1

<u>RCRA standards and requirements</u>

Identification and listing of hazardous waste, 40 *CFR* 261, Subpart B and *OAC* 3745-51

Standards applicable to generators of hazardous waste, 40 *CFR* 262 and *OAC* 3745-52

Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities, 40 *CFR* 264 and *OAC* 3745-51 through -57

LDRs, 40 *CFR* 268, *OAC* 3745-270

<u>TSCA standards and requirements</u>

TSCA PCB storage and disposal, 40 *CFR* 761, Subpart D

<u>Radioactive waste standards and requirements</u>

National emission standards for emissions of radionuclides other than radon from DOE facilities, 40 *CFR* 61.92

"Radiation Protection of the Public and the Environment," DOE Order 5400.5 and DOE Order 458.1

"Radioactive Waste Management," DOE Order 435.1-1

<u>Miscellaneous standards and requirements</u>

Ohio ambient air quality, fugitive air emission standards for dust and particulate matter, *OAC* 3745-17-08(B)

Authorization for Storm Water Discharges Associated with Construction Activity under NPDES OHC000003

Operation of an active asbestos-containing material waste disposal site, 40 *CFR* 61.154 and *OAC* 3745-20-06
Standards for management and disposal of universal wastes, 40 *CFR* 273 and *OAC* 3745-273

On-site storage of used oil, 40 *CFR* 279 and *OAC* 3745-279

<u>Transportation standards and requirements</u>

Transportation of DOT hazardous material off site, 49 *CFR* 171-180

Transportation of radioactive waste, DOE Order 435.1-1

Transportation of universal waste off site, 40 *CFR* 273.38 and *OAC* 3745-273-38

Transportation of used oil off site, 40 *CFR* 279.24 and *OAC* 3745-279-24

Transportation of asbestos-containing waste materials off site, 40 *CFR* 61.150 and *OAC* 3745-20-05

Transportation of TSCA PCB waste off site, 40 *CFR* 761.207

Transportation of hazardous waste off site, 40 *CFR* 262, *OAC* 3645-52

Off-site disposal alternative. The off-site disposal alternative consists of treating, as necessary, packaging, shipping, and disposal of all anticipated D&D waste to appropriately licensed and permitted off-site disposal facilities. Accordingly, ARARs associated with this alternative are listed in Table B.2 in Appendix B.

3.3 DATA QUALITY OBJECTIVES

The DQO process provides a structured approach to planning projects where environmental data are used to support decision making. Use of the DQO process leads to efficient and effective expenditures of resources; consensus on the type, quality, and quantity of data needed to meet the project goals; and full documentation of actions taken during development of the project. For this project, DOE generally applied the concepts defined in *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA 2006) and *Data Quality Objectives Process Summary* (Ohio EPA 2002) to the qualitative assessment of data needs. The DQO process is flexible to meet the needs of any study, regardless of project size. The DQO process uses a common-sense approach to ensure the level of documentation and rigor of effort in planning is commensurate with the intended use of the information and available resources.

In accordance with EPA and Ohio EPA DQO guidance, there are seven steps in the DQO process:

- Step 1–State the problem (define the problem that necessitates the study)

- Step 2–Identify the goal of the study (state how environmental data will be used in meeting objectives and solving the problem, identify study questions, define alternative outcomes)

- Step 3–Identify information inputs (identify data and information needed to answer study questions)

- Step 4–Define the boundaries of the study (specify target population and characteristics of interest, define spatial and temporal limits, scale of inference)

- Step 5–Develop the analytic approach (define the parameter of interest, specify the type of inference, and develop the logic for drawing conclusions from findings)

- Step 6–Specify performance (acceptance) criteria (develop performance criteria for new data being collected or acceptable criteria for existing data being considered for use)

- Step 7–Develop the plan for obtaining data (select the resource-effective SAP that meets the performance criteria)

A preliminary identification of data needs was made in the Sitewide Waste Disposition Evaluation PER. As a result of this effort and a data needs assessment, the data needs have been refined since submittal of the PER. Field data collection was identified to resolve two issues, which includes calculation of the on-site disposal WAC and identification of the site proposed for an OSDC. Therefore, data proposed to be collected for these two issues are identified through the steps of the DQO process and are developed in following text.

Step 1 – State the Problem

Since existing geotechnical, geological, and hydrological data from the PORTS site are not comprehensive enough to evaluate siting for a potential OSDC and determine WAC, additional data must be collected and analyzed to ensure identification of the most optimal site for a potential OSDC and to calculate WAC.

Step 2 – Identify the Goal of the Study (Identify the Decision)

The goal of this study is to evaluate the disposal alternatives and select the preferred alternative for PORTS D&D waste. The PER (DOE 2010a) discussed gaps in the data needed to identify and evaluate a suitable site for a potential OSDC and calculate a WAC for that site. A variety of subsurface and surface information will be collected and analyzed to support site evaluation. After siting, WAC will be derived using groundwater modeling and risk assessment methods. A WAC will be derived to ensure the protection of human health and the environment during and after waste disposal.

Step 3 – Identify the Inputs

To assist in the identification and evaluation of a suitable site, hydrogeologic data, geotechnical data, and the presence of existing contamination for each potential site need to be delineated and analyzed. Geochemical and geotechnical data are required input for groundwater models that will be used for WAC development.

Step 4 – Define the Boundaries of the Study

Four study areas have been identified as potential locations for a potential OSDC. To provide for design criteria, the study areas are larger than the footprint required for construction of a potential OSDC. The four study areas are identified in Figure 5.

Step 5 – Develop the Analytical Approach

Several intrusive field methods will be used to obtain the data required to support this study, including but not be limited to, cone penetrometer testing (CPT), direct-push technology, and other drilling methods suitable for drilling in both unconsolidated soil and bedrock formations. CPT will be used to identify the stratigraphy and verify the depth to groundwater in unconsolidated materials. Soil boring samples will consist of Shelby tube and split-spoon samples from discrete depth intervals. Depth to groundwater will be determined by drilling soil borings until the water table is reached. Piezometers will be installed in Study Areas A, C, and D to determine the depth because existing data from those areas are insufficient. During the drilling program, soil samples will be taken for contaminant analysis (metals, radionuclides, volatile organics, semivolatile organics, and PCBs). Geochemical analyses (pH, cation exchange, and TOC) and geotechnical analyses (e.g., Atterberg limits, water content, consolidation, and unconfined compression) will be conducted on surface and subsurface soil samples. Soil samples from the Minford and Gallia, as well as rock cores from the Cuyahoga Formation and Sunbury Shale, will be used for batch testing to determine site-specific distribution coefficients for uranium isotopes and Tc-99. Soil samples will be collected for analytical analyses to determine if “hot spots” (localized areas of contamination) are present within the three study areas.

Step 6 – Specify Performance or Acceptance Criteria

The QAPP, which will be submitted as an appendix to the SAP, will identify the acceptance criteria for the sampling activities. Laboratory and field quality control measures will be instituted to minimize errors.

Step 7 – Develop the Plan for Collecting Data

This step will be presented in the SAP for this activity.

3.4 PROJECT SCHEDULE

The RI will be initiated after the RI/FS Work Plan and any necessary SAPs have been reviewed and concurred upon by Ohio EPA. The RI/FS report is projected to be submitted to the Ohio EPA within 385 days of approval (a project Milestone per the DFF&O) of the work plan. Based on the D&D DFF&O, the PP is to be submitted within 90 days of final concurrence (a project Milestone per the DFF&O) on the RI/FS report, however, it may be submitted concurrently with the RI/FS report.

4. NONMEASUREMENT DATA ACQUISITION

Data to be gathered and reviewed from non-measurement sources and used in the execution of the RI/FS include the following:

- Information related to off-site disposal facilities (e.g., disposal capacity, anticipated closing dates)
- Cost parameters for all aspects of both the off-site and on-site alternatives
- Volume/size reduction and treatment technologies
- Information from other disposal facilities to assist in development of a conceptual design for a potential OSDC at PORTS

As engineering studies are completed, technical memorandums will be generated and included as attachments to the RI/FS report.

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5. FIELD ACTIVITIES

The primary focus of field sampling will be to collect physical samples from select process gas equipment and to initially characterize waste constituents present in select equipment and geochemical and geotechnical data related to siting and WAC development identified during DQO workshops. Two separate SAPs will be developed that will identify the media to be sampled during the sampling efforts and specify the methods for collecting and analyzing the samples. Investigation activities will use standard industry practices that are consistent with EPA procedures and protocols. If field conditions differ from those anticipated, the sampling approach will be discussed and revisions will be made, as needed, to the appropriate SAP. This section provides only a summary of the sampling and data collection that is detailed in each SAP. For more details related to the field sampling efforts, refer to the approved Process Equipment Characterization SAP (DOE 2011b) and the Waste Disposition SAP (DOE 2011c), submitted to Ohio EPA under separate cover.

5.1 PROCESS BUILDING EQUIPMENT CHARACTERIZATION EVALUATION

The planned characterization activities for the process buildings will be to collect process equipment samples to provide characterization data to verify process knowledge assumptions, and support the refinement of waste volume projections and definition of waste types for the Sitewide Waste Disposition Evaluation RI/FS as outlined in the approved Process Equipment Characterization SAP (DOE 2011b). Samples will be collected from primary process equipment (converters and compressors) and process auxiliary equipment (including other process gas systems such as surge drums, instrument lines, etc.) in the three process equipment buildings: X-333, X-330, and X-326. Following this initial data collection effort for the RI/FS, data collection under this plan will continue in support of the follow-on remedial design/remedial action to support the determination of WAC compliance for segments and/or individual components of the process gas system.

Characterization sampling and analysis will be conducted to provide data of known and acceptable quality for disposal at an approved off-site facility, or in a potential OSDC if selected in a ROD. Additionally, the data will assist in determining the necessary segregation, treatment, or decontamination actions that may be necessary to render individual components amenable for on-site disposal or off-site shipment.

This process building SAP includes the collection of intrusive and non-intrusive samples and measurements. Intrusive characterization will consist of the collection of physical samples by breaching the process gas system. Non-intrusive characterization will consist of collecting characterization data using nondestructive assay (NDA) techniques to support the RI/FS and the subsequent implementation of the selected remedy.

To support the characterization, the sampling program design will utilize both random sampling and judgmental sampling techniques. In all cases, intrusive samples will be collected at predetermined locations from the process equipment and analyzed for uranium isotopes and other constituents. Following the establishment of the sampling capability, the individual pieces of equipment will be removed from the process line and moved to a low background area for a non-intrusive NDA analysis.

The intrusive samples will include barrier material and shell coupons from converters, deposit material from the seal/seal cavity areas within the compressors, and coupons from process auxiliary equipment. Sample locations associated with the random sampling program are preselected using a random number selection process, allowing for an equal likelihood of selection. In contrast, the judgmental sample locations were preselected based on the process knowledge of the concentration of uranium isotopes within the process gas systems.

5.2 SITING AND WAC DEVELOPMENT

For the siting analysis and WAC development data collection efforts, several intrusive field methods will be used to obtain the required geotechnical, geochemical, and analytical data as outlined in the Waste Disposition SAP (DOE 2011c) . These methods include but are not limited to CPT, drilling in both unconsolidated and bedrock formations to collect soil samples for geotechnical and geochemical testing, and installation of piezometers. CPT will be used to identify the stratigraphy and verify the depth to groundwater in unconsolidated materials. CPT is an in situ testing method used to determine geotechnical engineering properties of soils and delineate soil stratigraphy. The CPT will be used in both unconsolidated subsurface soils and weathered bedrock.

Soil boring samples will consist of Shelby tube and split-spoon samples from discrete depth intervals. Geotechnical analyses (e.g., Atterberg limits, water content, consolidation, and unconfined compression) and geochemical analyses (e.g., K_d, TOC, and cation exchange) will be conducted on soil samples. Soil samples from each geologic stratum will be used for batch testing to determine site-specific distribution coefficients (K_d) for uranium isotopes and Tc-99. During the drilling program, soil samples will also be collected for contaminant analysis (metals, radionuclides, volatile organics, semivolatile organics, and PCBs) and fraction of organic content (f_{oc}) for determining the K_d for organic compounds.

The number of CPT locations, soil borings, and sample types are presented in Table 11. Because less data exists for Study Areas A, C, and D, most of the sampling will be performed in those areas. Data collected from Study Areas A and C will also support evaluation of a composite OSDC footprint of the two areas (i.e., Study Areas A and C). This composite site incorporates Ohio EPA feedback during technical information exchange meetings between DOE and Ohio EPA. The minimum number and types of geotechnical and hydraulic conductivity tests to be performed within each area are listed in Table 12. These test numbers assume a single saturated unit within each area. If multiple saturated units are encountered, each unit will be tested as described herein.

Eleven piezometers will be installed within Study Areas A, C, and D to verify the depth to groundwater. It is proposed to complete four of the soil borings in the Cuyahoga Formation and/or Sunbury Shale at Study Area C as bedrock piezometers to collect information on depth to groundwater in those shale formations immediately above the Berea Sandstone. Four bedrock piezometers will be installed at Study Area D within the Cuyahoga Formation and/or Sunbury Shale above the Berea Sandstone to investigate the possible water table in those units. A minimum of three soil borings in Study Areas C and D will extend to the Berea Sandstone to verify the water level in that unit. The bedrock piezometers will be completed with a 5-ft screen in the shale overlying the Berea Sandstone to determine the depth to water, if the shale is saturated. If the shale formations are competent, an open borehole completion may be used rather than a screen and filter pack. The remaining three piezometers will be installed in Study Area A within the unconsolidated Minford/Gallia members. Two monitoring wells will be installed along the eastern boundary of the DOE reservation near Study Area C, and four monitoring wells in Study Area D for long-term monitoring of the Berea Sandstone.

Table 11. Sampling Summary for the Siting and WAC Development Investigation

Study Area	CPT Locations	Soil Borings	Geotechnical Samples[a]	Geochemical Samples	Analytical Samples[b]
Quadrant I Study Area A and C Combined	13	17	37	13	55
Quadrant IV Study Area B	0	4	8	5	12
Quadrant IV Study Area D	8	15	28	6	114
TOTAL	**21**	**36**	**73**	**24**	**181**

[a]Represents the minimum number of geotechnical tests for index properties per each study area.

[b]Contaminant characterization samples will be attempted from the following depth intervals (0 to 1 ft; 3 to 5 ft; 10 to 12 ft; 17.5 to 19.5 ft; and 22.5 to 24.5 ft) in the Minford or residual soil above bedrock plus, at Study Area D, at 12-inches and 10-ft below the interface in the Cuyahoga, Sunbury, and Berea.

CPT = cone penetrometer test

Table 12. Minimum Number of Geotechnical Tests Per Study Area

Test Method	Test Description	Study Area A Only	Study Area B	Study Area C Only	Study Areas A and C Overlap	Study Area D	Totals
Index Properties							
ASTM D 2487	Engineering Classification	12	8	14	11	28	73
ASTM D 2216 or ASTM D 7263	Moisture content	12	8	14	11	28	73
ASTM D 422	Grain size (including hydrometer)	12	8	14	11	28	73
Performance Properties							
ASTM D 854	Specific gravity	12	8	14	11	28	73
ASTM D 4318	Atterberg limits	12	8	14	11	28	73
ASTM D 698 or ASTM D 4253	Standard Proctor or Relative Density[a]	1[a]	1[a]	0	0	0	2[a]
ASTM D 698	Standard Proctor	1	0	1	1	1	4
ASTM D 4767	Consolidated Undrained Triaxial	4	5	5	4	5	23
ASTM D 2435	One-dimensional consolidation	8	5	6	4	5	28
ASTM D 5311	Cyclic Triaxial Testing	0	1	0	0	2	3
ASTM D 5084, ASTM D 2434, or ASTM D 6836	Hydraulic Conductivity (undisturbed)	3	3	3	2	3	14

Table 12. Minimum Number of Geotechnical Tests Per Study Area (Continued)

Test Method	Test Description	Study Area A Only	Study Area B	Study Area C Only	Study Areas A and C Overlap	Study Area D	Totals
Performance Properties (Continued)							
ASTM D 5084	Hydraulic Conductivity (remolded)	0	0	0	0	2	2
ASTM D 4525	Hydraulic Conductivity (rock core)	0	0	2	0	4	6
ASTM D 3080	Direct Shear[a]	1[a]	1[a]	0	0	0	2[a]
ASTM D 1883	California Bearing Ratio (socked)	1	0	0	0	0	1
ASTM D 1883	California Bearing Ratio (unsocked)	1	0	0	0	0	1

Note: FBP expects to collect more samples than will be needed to represent soil and rock materials encountered in each area.

[a]Attempt to obtain enough material for at least one sample from Gallia member to run direct shear and compaction testing (could be from any area). Actual specimens to be tested will be determined by the geotechnical testing/engineering subcontractor based on materials encountered during drilling operations, sample recovery, and condition of samples extracted.

ASTM = American Society for Testing and Materials

6. FIELD OPERATIONS DOCUMENTATION

Project records, including field operating records, field investigation data, sample collection information, and analytical data records will be managed in accordance with FBP procedures. The Field PM is responsible for reviewing and approving the project records and for ensuring the project records are transferred to the PORTS project files for long-term storage. While the project is active, conforming copies of records will be maintained at the project field office in secure locations either as hard or electronic copies.

Field operating records include but are not limited to boring logs, chain-of-custody forms, and logbooks. As these records are completed by the project team, they will be reviewed, processed, evaluated on site, and submitted to the appropriate Field Task Lead for review. Records will be submitted to the appropriate subject matter expert for review of completeness, accuracy, reasonableness, and document final acceptance.

Field team personnel will use bound field logbooks with sequentially numbered pages for the maintenance of field records and for the documentation of any information pertinent to field activities. Field forms will be numbered sequentially or otherwise controlled. A designated field team member will record sampling activities and information in the field logbooks. Field documentation will conform to the FBP procedures for use of logbooks (LPP-PORTS-GWS-009, *Field Logbooks*, and LPP-Proc-012, *Field Logbooks and Data Forms*). Specific types of information to be recorded in each logbook are provided in Section 6.2 of each SAP.

The project will implement data management processes to meet the requirements of the PORTS environmental information system database, the Portsmouth Data Warehouse. The Sample Manager will be responsible for recording field and laboratory data into a computerized format as required by this system. Upon completion of data review and clearance for release to the public, project data will be transferred from the Project Environmental Management System (PEMS) database to the Portsmouth Data Warehouse. All data entered into the PEMS database and submitted to the Portsmouth Data Warehouse shall correspond with the data contained in the original laboratory reports, field data collection forms, sample chain-of-custody forms, and other documents associated with the sampling and laboratory analysis tasks. Section 6.4 of each SAP provides information required for sample documentation.

Each SAP provides details regarding the management of project records, field investigation data, sample collection information, and analytical data records. Refer to Section 6 in both the Process Equipment Characterization SAP and Waste Disposition SAP for more detail.

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7. SAMPLE PACKAGING AND SHIPPING REQUIREMENTS

Each SAP will provide information and details about packaging and shipping requirements for the samples. Refer to Section 7 in both the Process Equipment Characterization SAP and Waste Disposition SAP for more detail. Shipments of samples from the field to the laboratory will occur typically within 48 hours of collection. Samples requiring analyses with short holding times will be identified and designated as such on the chain-of-custody form and shipped on the date of collection.

Upon laboratory receipt of the samples, the laboratory sample custodian will note the condition and temperature of the cooler received as well as any questions or observations concerning sample integrity. The laboratory sample custodian will record the condition and verify the presence of each sample named on the chain-of-custody form. Nonconformances noted in the sample identifications, types of analyses, or sample condition upon receipt will be documented and the Field PM will be notified. The laboratory will maintain an internal sample tracking record that will document the date of sample removal from storage; extraction, preparation, and analysis information; and laboratory-assigned sample number, which is affixed to each sample container upon sample receipt.

Field samples may only be held for a time period that does not exceed or affect the required method extraction and analysis holding times. Samples may be accumulated at the laboratory to form an analytical batch that consists of a maximum of 20 field samples of the same matrix or similar composition. Associated field QC samples, including trip blanks (if required), equipment rinsates, and field duplicates will be designated on the chain-of-custody form and may be included in the analytical batch. Samples and sample extracts will be stored by the laboratory in their original containers in refrigerators designated by the subcontracted laboratory. The minimum storage time for the samples and the sample extracts is a function of the analytical method holding time for a given analysis.

Samples will be tracked in the PEMS database as they are collected, packaged, and shipped or delivered to the laboratory for analysis. Sample information can be accessed by the analytical laboratory through the PEMS database.

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8. INVESTIGATION-DERIVED WASTES OR CONTAMINANTS

Following EPA guidance, IDW is considered part of the site and will be managed with other wastes from the site consistent with the final remedy. Each SAP will address the management of any IDW generated by the respective investigation.

Waste materials from this project will be managed in accordance with all applicable or relevant and appropriate federal, state, and DOE site requirements. Waste generated during this project will be characterized in accordance with applicable *OAC* solid and hazardous waste regulations and shipped to an appropriate treatment and/or disposal facility. Both liquid and solid waste will be generated during this sampling activity.

Liquid wastes may include decontamination water, well development water, and other waste waters generated as a result of sampling activities, including decontamination of soil sampling equipment (e.g., split-spoons, stainless bowls). During sampling efforts, a decontamination pad will be assembled to capture decontamination fluids generated when decontaminating the drilling and sampling equipment. All liquid waste generated during decontamination of sampling equipment will be captured and containerized. The liquid wastes will be treated at existing, permitted on-site groundwater treatment facilities, and/or sent to an approved off-site facility for disposal. Treatment of liquid waste at an existing, permitted on-site groundwater treatment facility will be allowed after consultation with Ohio EPA.

Solid wastes may include contaminated soils, excess soil from soil sampling, and contaminated personal protective equipment. The solid waste will be characterized and sent to an approved off-site treatment and disposal facility as necessary. If radiological contamination is found, the waste will be containerized and sent to an approved off-site facility for disposal.

9. FIELD ASSESSMENT PROCEDURES

Field assessment procedures are implemented to provide the quality of data suitable for their intended use and to ensure the project DQOs are met. Field assessment procedures are addressed in each SAP.

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10. NONCONFORMANCE/DEVIATIONS

Nonconforming items, services, or processes will be identified, controlled, and reported in accordance with a DOE prime contractor-approved procedure. Equipment that fails calibration or becomes inoperable during use will be tagged, removed from service, and separated from serviceable equipment to prevent inadvertent use. Such equipment will be repaired and recalibrated or replaced as appropriate. No equipment that has failed calibration will be used until the equipment has been repaired or replaced. Contractor personnel will initiate a nonconformance report, and any corrective actions will be implemented and documented in the field logbook.

Certain weather conditions, such as high humidity, can interfere with the calibration and operation of field screening equipment. If these conditions are encountered, they should be noted in the field logbook and operation of the equipment should be discontinued.

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11. REFERENCES

BJC 2002, *Preliminary Assessment for a Potential On-site Waste Disposal Facility at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, Bechtel Jacobs Company, LLC, BJC/PORTS-331&D0, November.

BJC 2003a, *Identification and Screening of Candidate Sites for a Potential On-site Waste Disposal Facility at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* BJC/PORTS-448, April.

BJC 2003b, *Waste Volume/Characteristics Inventory for the Evaluation of a Potential On-site Waste Disposal Facility at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, BJC/PORTS-449, April.

DOE 1994a, *Vadose Zone Soil Leaching Report (Model and PRG Development) for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/OR/12-1249&D1, U.S. Department of Energy, Piketon, OH, June.

DOE 1994b, *Secretarial Policy Statement on the National Environmental Policy Act of 1969*, DOE Headquarters, Washington, D.C.

DOE 1996a, *Baseline Ecological Risk Assessment, Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/OR/11-1316/V1&D2, U.S. Department of Energy, Oak Ridge, TN.

DOE 1996b, *Background Sampling Investigation of Soil and Groundwater Final Report for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/OR/11-1323&D6, U.S. Department of Energy, Piketon, OH, July.

DOE 2001a, *Radioactive Waste Management*, DOE Order 435.1, U.S. Department of Energy, Washington, D.C., August.

DOE 2001b, *Radioactive Waste Management Manual*, DOE Manual 435.1-1, U.S. Department of Energy, Washington, D.C., June.

DOE 2006a, *Cost and Schedule Summary Report, Scenarios I-VI, Draft Final*, U.S. Department of Energy, Piketon, OH, June.

DOE 2006b, *Portsmouth Gaseous Diffusion Plant Decontamination and Decommissioning Project On-site Waste Disposal Facility Conceptual Design – Final Submittal*, U.S. Department of Energy, Piketon, OH, August.

DOE 2010a, *Pre-investigation Evaluation Report for the Sitewide Waste Disposition Evaluation Project at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/PPPO/03-0124&D1, U.S. Department of Energy, Piketon, OH, October.

DOE 2010b, *Remedial Investigation/Feasibility Study Report for CERCLA Waste Disposal Alternatives Evaluation at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-0244&D1, U.S. Department of Energy, Paducah, KY, May.

DOE 2011a, *Methods for Conducting Human Health Risk Assessments and Risk Evaluations at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* DOE/PPPO/03-0127&D2. U.S. Department of Energy, Piketon, OH, July.

DOE 2011b, *Phase I Sampling and Analysis Plan for the Process Equipment Characterization in Support of the Site-Wide Waste Disposition Evaluation Project at the Portsmouth Gaseous Diffusion Plan, Piketon, Ohio*, DOE/PPPO/03-0210&D2, U.S. Department of Energy, Piketon, OH, July.

DOE 2011c, *Geotechnical Sampling and Analysis Plan for the Sitewide Waste Disposition Evaluation Project at the Portsmouth Gaseous Diffusion Plan, Piketon, Ohio*, DOE/PPPO/03-0193&D2, U.S. Department of Energy, Piketon, OH, August.

EPA 1988, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, EPA/540/G-89/004, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C., October.

EPA 1989, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Interim Final*, EPA/540/1-89/002, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C., available at http://www.epa.gov/oswer/riskassessment/ragsd/tara.htm.

EPA 1991, *ARARs Q's and A's: General Policy, RCRA, CWA, SDWA, Post-ROD Information, and Contingent Waivers*, OSWER Directive 9234.2-01FS-A, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C., June.

EPA 1994, *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*, OSWER Directive 9355.4-12, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C., August.

EPA 2006, *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C., February.

Law Engineering 1978, *Final Report Gas Centrifuge Enrichment Plant Geotechnical Investigation, Piketon, Ohio,* Law Engineering, Marietta, GA.

LMES 1997, *Final Threatened and Endangered Species Report*, DOE/OR/11-1668&D0 and POEF-LMES-166, Lockheed Martin Energy Systems, Inc., Piketon, OH.

Ohio EPA 2002, *Data Quality Objectives Process Summary*, Ohio EPA Division of Emergency and Remedial Response, DERR-00-DI-32, January.

Ohio EPA 2011, *Director's Final Findings and Orders – Modification of April 13, 2010, Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project)*, Ohio Environmental Protection Agency, September 12.

TPMC 2006a, *Waste Management Plan for the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* TPMC/PORTS-60/R1, Theta Pro2Serve Management Company, LLC, September.

TPMC 2006b, *Conceptual Design Report for the Decontamination and Decommissioning Project at the Portsmouth Gaseous Diffusion Plant, Piketon, OH*, TPMC/PORTS-81/R1, Theta Pro2Serve Management Company, LLC, Piketon, OH, September.

TPMC 2006c, *Facility Condition Survey of the Portsmouth Gaseous Diffusion Plant Facilities, Piketon, Ohio*, Theta Pro2Serve Management Company, LLC, Piketon, OH, August.

TPMC 2007, *Railroad Infrastructure at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, TPMC/PORTS-166, Theta Pro2Serve Management Company, LLC, December.

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APPENDIX A: PRELIMINARY SITE SCREENING FOR AN ON-SITE DISPOSAL CELL

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TABLE

A.1. Site-screening Criteria for a Potential OSDC A-1

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ACRONYMS

ACP	American Centrifuge Plant
ARAR	applicable or relevant and appropriate requirement
BJC	Bechtel Jacobs Company LLC
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
D&D	decontamination and decommissioning
DFF&O	*Director's Final Findings and Orders – Modification of April 13, 2010, Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project)*
DOE	U.S. Department of Energy
FS	feasibility study
Ohio EPA	Ohio Environmental Protection Agency
OSDC	on-site disposal cell
PORTS	Portsmouth Gaseous Diffusion Plant
PP	proposed plan
RCRA	Resource Conservation and Recovery Act of 1976
RI	remedial investigation
ROD	Record of Decision
SSAB	Site Specific Advisory Board
TPMC	Theta Pro2Serve Management Company, LLC
USEC	United States Enrichment Corporation
WAC	waste acceptance criteria

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A.1 INTRODUCTION AND BACKGROUND

This appendix presents a preliminary evaluation for the siting of a potential on-site disposal cell (OSDC) at the Portsmouth Gaseous Diffusion Plant (PORTS). The U.S. Department of Energy (DOE) is evaluating waste management options for waste generated as a result of the proposed decontamination and decommissioning (D&D) of facilities at PORTS. A remedial investigation/feasibility study (RI/FS) will evaluate three alternatives for the waste: 1) no action; 2) on-site disposal; and 3) off-site shipment and disposal. One possible option for the on-site disposal alternative is to design, construct, and operate an OSDC to accept waste from PORTS D&D activities and potential Resource Conservation and Recovery Act of 1976 (RCRA) Consent Decree cleanup. The proposed OSDC would be planned, sited, and constructed pursuant to the *Director's Final Findings and Orders – Modification of April 13, 2010, Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project)* (DFF&O) (Ohio Environmental Protection Agency [EPA] 2011), which uses the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) process as a framework for activities pursuant to the DFF&O.

DOE has completed a preliminary assessment of the volume, types, and forms of waste that would be generated from site cleanup activities. The assessment has estimated approximately 2.2 million cy of waste will be generated. An identification and screening report (Bechtel Jacobs Company, LLC [BJC] 2003a) was prepared to identify candidate sites for an OSDC. This report considered a potential OSDC that would consist of an above-grade, RCRA-compliant earthen disposal cell with a capacity for 4 million cy of waste (based on preliminary estimates in the waste volume/characteristics inventory [BJC 2003b]) and a footprint of 150 acres for landfill, buffer, and support facilities.

Sixteen candidate sites were initially identified throughout the DOE property (Figure A.1) that met the preliminary siting requirements and could reasonably be considered acceptable areas for placement of a potential OSDC. To be considered an initial candidate site, the site had to be located entirely within DOE-owned property, contain at least 150 contiguous acres, and not be technically or administratively impracticable or cost prohibitive. The 2003 screening effort (BJC 2003a) recommended three sites (Sites 2, 8, and 16) for further evaluation in an RI/FS (Figure A.1). The process and results of this screening evaluation is discussed in Section A.2.

As part of the scoping for the Sitewide Waste Disposition Evaluation RI/FS, the three sites recommended for further evaluation were reassessed for inclusion in the associated work plan. Through this reassessment, one of the initial candidate sites was dropped from final consideration (Site 16) while two were maintained (Sites 2 and 8). Additionally, two new sites, originally evaluated in the 2003 study, were reconsidered for evaluation. This updated process and results are discussed in Section A.3.

Subsequent sections in this appendix discuss the path forward for selecting a site (see Section A.4) and the regulatory and public interface (see Section A.5).

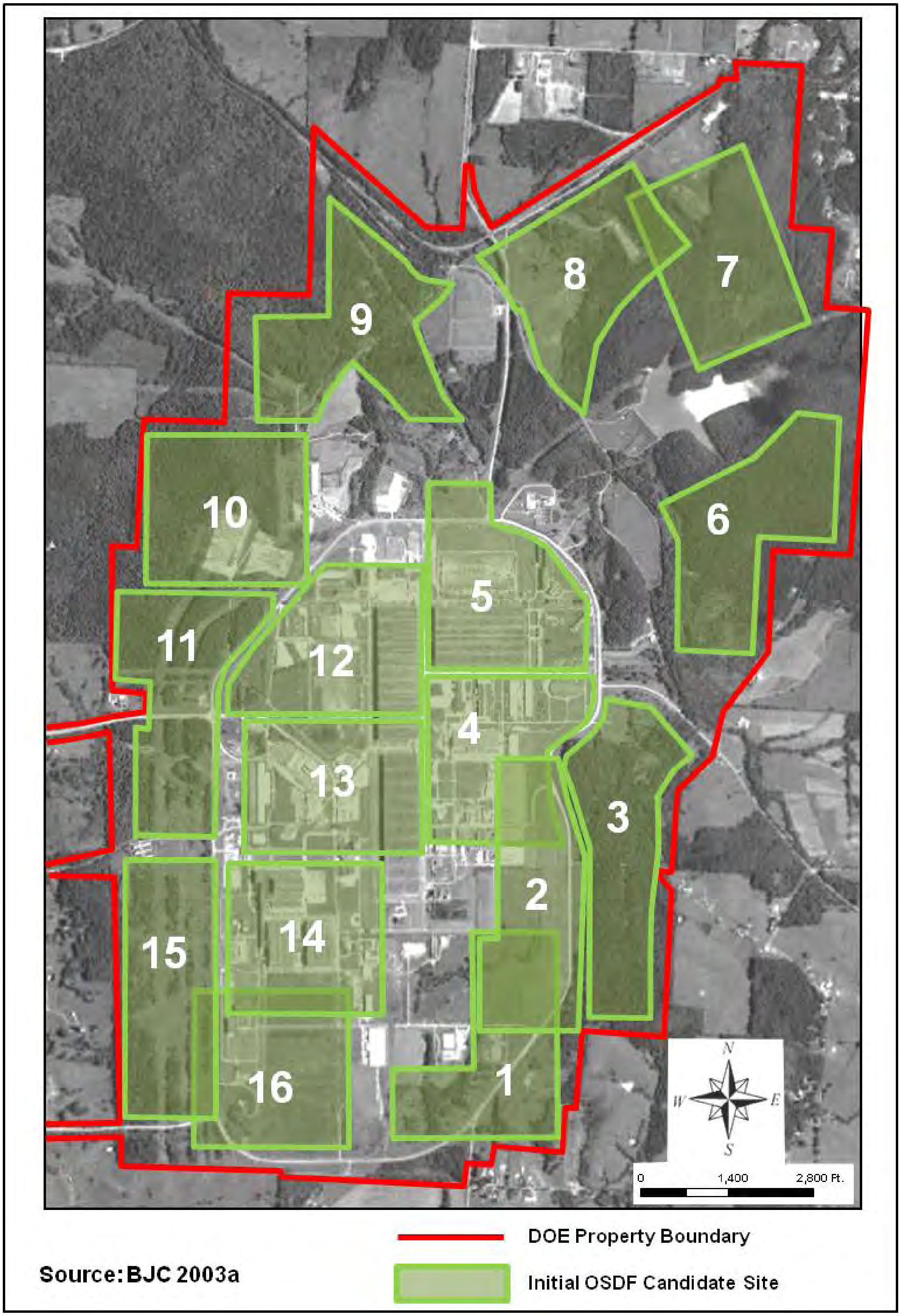

Figure A.1. Initial Candidate Sites for a Potential On-site Waste Disposal Cell at PORTS

A.2 HISTORICAL SCREENING PROCESS AND RESULTS

This section summarizes results from previous screening studies that were conducted previously in 2003. These studies predated issuance of the DFF&O.

A.2.1 HISTORICAL SCREENING CRITERIA

In the preliminary screening effort (BJC 2003a), site-screening criteria were separated into three tiers or levels (threshold, modifying, and final) to facilitate the elimination of sites deemed unsuitable for siting. Specific criteria were established by the evaluation of applicable or relevant and appropriate requirements (ARARs) and the review of existing documents, maps, topographic features, infrastructure, hydrogeologic features, National Environmental Policy Act of 1969 considerations, etc. The site-screening criteria used in the 2003 effort are included in Table A.1. This site screening was performed in phases (primary, secondary, final).

The primary phase consisted of a preliminary evaluation of the candidate sites by applying the threshold criteria, which are those minimum conditions that a potential site must satisfy to be carried into the next stage of evaluation. The threshold criteria screening was conducted by reviewing available documents, data, and maps. Sites that failed the threshold criteria were eliminated from further consideration in the evaluation process.

The secondary phase consists of the application of the modifying criteria, which comprise the bulk of the evaluation process. Modifying criteria are generally qualitative considerations and are more flexible than threshold criteria. If a candidate site did not fully meet the objectives of a modifying criterion, efforts could be focused on mitigating measures.

The final phase in the screening process consisted of application of the final screening criteria, programmatic considerations, which include availability or time frame for development of a site based on D&D schedules, potential acceptance by the public or regulatory agencies, or other criteria DOE or stakeholders deemed to directly affect selection of a site.

A.2.2 IDENTIFICATION AND SCREENING OF 16 CANDIDATE SITES

Sixteen candidate waste disposal facility sites were identified (Figure A.1) after considering areas that would be suitable within the DOE-owned property. To be considered an initial candidate site, the site must be located entirely within the DOE-owned property, contain at least 150 acres of contiguous property, and not be technically or administratively impracticable or cost prohibitive.

During the preliminary review performed for the April 2003 siting report, several areas were not considered suitable sites for locating a waste disposal facility. Most of these areas were excluded because of technical or administrative impracticability or cost-prohibitive considerations, including pre-existing capped landfills, major water features, and the on-site water treatment facility. These areas were considered pre-existing dedicated land-use areas.

As part of the overall site-screening process, the 16 initial candidate sites were first evaluated against the threshold criteria. This primary screening evaluates the sites against the following criteria:

- Available area
- Location of floodplains
- Seismic considerations

Table A.1. Site-screening Criteria for a Potential OSDC[a]

Types of criteria	Category	Site-screening criteria
Threshold	Available area	• Is the site located within the DOE boundary? • Does the site have a 150-acre contiguous area? • Is the site free of a pre-existing dedicated land-use area? • Is the location of the site technically practicable (i.e., no major cut and fill earthworks)?
	Floodplains	• Is the site located above the 100-year floodplain?
	Seismic considerations	• Is the site located ≥ 200 ft from Holocene faults and lineaments?
Modifying	Hydrologic considerations	• Is there sufficient distance to perennial streams? • Is surface water run-on minimized? • Is the site located outside of a groundwater discharge or recharge area? • Is the site located outside of a sole-source aquifer boundary or endorsed well head protection area? • Is the site located in areas free of groundwater contamination?
	Wetlands	• Is the site free of designated jurisdictional wetland areas?
	Suitable terrain	• Is the site free of surface geologic processes (mass wasting, erosion, slumping, landsliding, or weathering)? • Does the site have low to moderate topographic relief (i.e., < 130 ft)? • Is the site located in an environment free of karst, subsidence, underground mines, or potential liquefaction?
	Land-use considerations	• Is the site free of areas with potential current/future operations/land-use conflict concerns? • Is the site located in an area where minimal facility demolition will be required? • Is the site unimpacted by PORTS operations?
	Infrastructure	• Is the site located in an area where roads and railroads are available for site access? • Is site located in an area where impacts to roads/railroads are minimal (i.e., relocation unnecessary)? • Is the site located in an area where utilities are available for site construction and operations? • Is the site located in areas where minimal impact/relocation of utilities (sanitary/storm sewers, water, gas, and power lines) would be required?
	Ecological and cultural resources	• Is the site free of habitat areas for threatened, endangered, or special interest species? • Is the site free of environmentally sensitive areas? • Is the site free of historical and archaeological resources?
	Buffers	• Is the site located in an area that is not in close proximity to private domestic water wells? • Is the site located in an area where there is expected to be little or no impact on projected population growth? • Is the site located in an area that is not in close proximity to residence/school/public recreational areas? • Is vertical separation between waste and the historical high water table ≥ 50 ft?
Final	Programmatic considerations	• Is the site located in an area that is free of availability/time frame considerations, or other action concerns (e.g., D&D schedule or deferred units)? • Will stakeholders (e.g., DOE, USEC, regulatory agencies, nearby residents, public) accept this site? • Does the location of this site address the DOE request that an impacted and nonimpacted site be considered?

[a]BJC 2003a.

D&D = decontamination and decommissioning
DOE = U.S. Department of Energy
OSDC = on-site disposal cell
PORTS = Portsmouth Gaseous Diffusion Plant
USEC = United States Enrichment Corporation

Candidate sites had to meet the threshold criteria to pass the primary screening process and be carried forward to the next step in screening. Six sites (Sites 3, 6, 9, 10, 11, and 15) were screened out during the primary screening. One of these, Site 9, was eliminated from further consideration because the west-central portion of the site is located within the 100-year floodplain of Little Beaver Creek, while five sites (Sites 3, 6, 10, 11, and 15) were eliminated from further consideration because of technical impracticability (concerns related to high topographic relief that qualitatively make the site technically impracticable and/or cost prohibitive to prepare for disposal activities). The topographic relief at these six sites ranges from 135 to 255 ft. The ten remaining candidate sites were carried forward to the next phase of the screening process (i.e., screening based on modifying criteria).

The next step in the screening process is application of the modifying criteria, which comprise the bulk of the evaluation process. The 10 technically feasible candidate sites that passed the primary screening (Sites 1, 2, 4, 5, 7, 8, 12, 13, 14, and 16) were evaluated during this step, which included an intensified review of documents and data, continued coordination with personnel knowledgeable of PORTS site conditions, and site reconnaissance.

The last step in the screening process is the application of the final screening criteria, which are programmatic considerations. These considerations include availability or time frame for development of a site based on D&D schedules and potential acceptance by the public, regulatory agencies, or other stakeholders that would directly affect selection of a site.

A.2.3 FINDINGS AND RECOMMENDATIONS FROM THE 2003 SITING STUDY

Sites 2, 8, and 16 were selected as candidate sites and recommended for further DOE evaluation during the 2003 site-selection process. Each site has its own positive attributes and was selected over other candidate sites on the basis of site comparisons against modifying and final criteria. Site selection was also guided by the DOE request that final sites include at least one site located within an area that had been impacted by former waste management activities and one site located in an area that had not been impacted. For the purpose of this discussion, an impacted area is an area that has been contaminated by past operations or is located adjacent to contaminated areas. It also includes areas located adjacent to waste management or disposal operations, regardless of whether contamination exists at these locations. Sites 2 and 8 were nonimpacted sites and Site 16 was an impacted site.

The April 2003 siting study recommended further characterization of these three sites through field studies to select the best location for a potential OSDC.

A.3 SELECTION OF SITES FOR THE RI/FS

This section presents a discussion of the recommended sites for a potential OSDC at PORTS for consideration in the RI/FS. The final recommended sites for inclusion in the RI/FS are presented in Figure A.2.

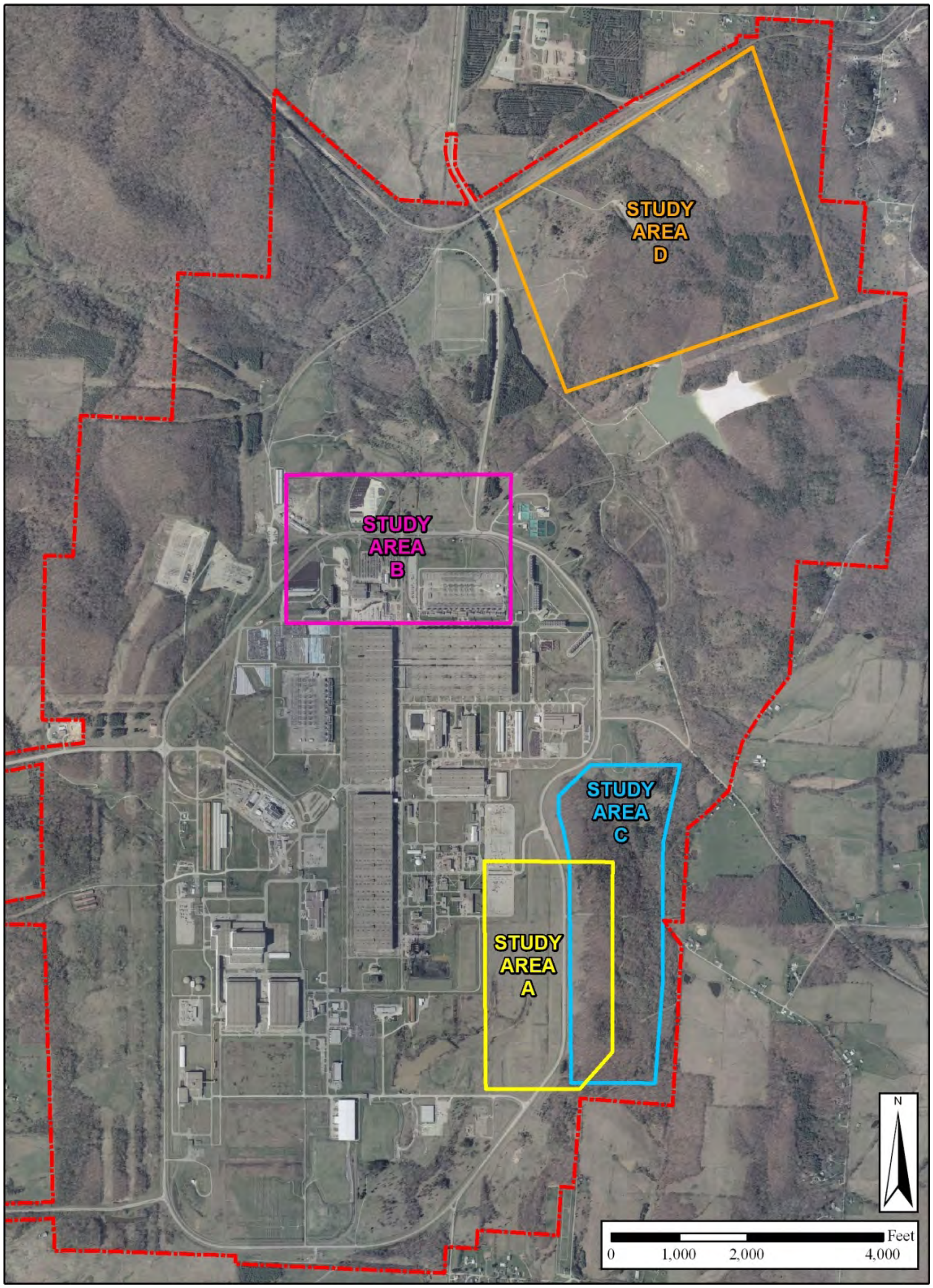

Figure A.2. Four Study Areas Recommended for Evaluation in the PORTS Sitewide Waste Disposition Evaluation Project RI/FS

A.3.1 HISTORICAL SCREENING CRITERIA

Based on the 2003 screening, 16 potential sites were identified (Figure A.1) and screened against individual criterion categorized as threshold, modifying, or final criteria. These screening criteria (Table A.1) were reviewed and determined to be appropriate for selecting potential sites for inclusion in the RI/FS. State and Federal regulations used to develop the criteria were checked to determine if there had been any changes in the regulatory requirements. Most importantly, an evaluation of land use changes since the initial screening was completed was conducted, as well as input from stakeholders.

A.3.2 RECOMMENDATIONS OF SITES FOR RI/FS CONSIDERATION

The screening results were reassessed to determine the most suitable sites for further evaluation in the RI/FS. When the screening criteria had been evaluated and refined as discussed above, the 2003 evaluation process was repeated with the three sites recommended in that study. Sites 2 and 8 are still considered viable. Site 16 lies within an area anticipated to be used for expansion of the American Centrifuge Plant (ACP). The United States Enrichment Corporation (USEC) currently leases facilities on the DOE reservation for the ACP. Current USEC plans are to proceed with a commercial centrifuge enrichment facility that could expand southward into the area of Site 16, therefore further consideration is not recommended.

The preliminary conceptual design *Conceptual Design Report for the Decontamination and Decommissioning Project at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (Theta Pro2Serve Management Company, LLC [TPMC] 2006) was developed as part of DOE D&D planning. This design report identified four possible locations for a potential disposal facility including two of which were from the original recommendation (Sites 2 and 8), one from the original screening evaluation but was dropped (Site 4) and one that was added which is a slight modification to the original Site 5.

Beginning in early 2011, the FBP team began discussions with OEPA regarding potential locations for a potential OSDC and the associated data needs. The original Site 2 and modified Site 5 were retained for further evaluation. Site 8 was soon added to the discussion. Additionally, since Section VI.13.b of the DFF&O requires an alternative or sub-alternative that includes a fully ARAR-compliant OSDC with no waived ARARs if an OSDC is to be evaluated as a remedial alternative in the RI/FS, Site 3 from the original 2003 evaluation was reconsidered for evaluation in the RI/FS. This site was originally screened out because of its location along a ridge and topographic relief of 135 ft, which requires extensive earthwork to prepare the site for a potential OSDC. However, being located along a ridge underlain by shale provides a favorable hydrogeologic condition when combined with a potential depth to groundwater beneath the OSDC liner of 50 ft or greater. Only one monitoring well is currently located near this site, and the measured depth to groundwater is approximately 80 ft below the ground surface. These candidate sites, Sites 2, 5, 3, and 8, were subsequently renamed as Study Areas A, B, C, and D, respectively, as a means to differentiate them from the previous studies and give them new perspective for future consideration.

The following sections provide additional rationale for including these four study areas for consideration. Each study area is larger than any potential footprint of an OSDC. The actual location of the landfill would be selected during the detailed design of the facility as part of the RI/FS.

A.3.2.1 Study Area A

Study Area A was selected for evaluation primarily because it contains open areas of low to moderate topographic relief (95 ft) and has been marginally impacted by site operations. The only major surface structures within the site include an abandoned airstrip, parking areas, and a portion of Perimeter Road (approximately 3,800 ft) that lies along the eastern and southeastern edges of the site. Study Area A does

not contain any buildings or structures located in a land-use conflict area or scheduled for D&D, reindustrialization and reuse, or future redevelopment infrastructure. However, this site is designated as having a potential future land use as large-scale office/industrial. Study Area A also offers engineering options such as using the existing landscape as part of the design for a potential OSDC by building the cell into the hillside and blending it with the topography. No jurisdictional wetlands or ecologically sensitive areas are located within Study Area A.

Study Area A is in close proximity to existing utilities, which is beneficial for construction and operation of a potential OSDC. However, this area contains approximately 4,800 ft of natural gas pipeline that would need to be relocated. This site is relatively close to the East and South Access Roads.

A.3.2.2 Study Area B

Study Area B was selected as a site for evaluation primarily because it represents a site impacted by contamination while being partly industrialized. This site has low to moderate topographic relief of less than 60 ft, is very accessible by road and railway, and is in close proximity to existing utilities necessary for construction and operation of a potential OSDC. Major surface structures within the site include the X-344 facility, four electrical transmission towers, cylinder yards, and a portion of Perimeter Road (approximately 4,500 ft). The removal of these structures is part of a separate DFF&O decision. Approximately three small wetland areas are located within Study Area B along some of the drainage ditches. The X-344 facility may be among the last facilities scheduled for D&D, which would impact construction of an OSDC.

A.3.2.3 Study Area C

Study Area C was selected as a site for evaluation primarily because of the underlying geology. Study Area C is mostly underlain by Cuyahoga Shale and its topographic relief (approximately 135 ft) may provide a separation of the water table and liner of more than 50 ft (40 *Code of Federal Regulations* Sect. 761.75[b][3]). This area does not contain any buildings or structures in a land-use conflict area or scheduled) for D&D, reindustrialization and reuse, or future redevelopment infrastructure. No wetlands or ecologically sensitive areas are located within Study Area C, but there are two small ponds and several historical properties that require a Phase 2 archaeological survey. This site is relatively close to the East and South Access Roads.

A.3.2.4 Study Area D

Study Area D was selected as a site for evaluation primarily because of the underlying geology as represented in the document *Ground Water Pollution Potential of Pike County, Ohio* (Frederick and Angle 2003) and the remote location relative to the developed portion of PORTS, despite it having a potential future land use for industrial development. Study Area D has moderate topographic relief of 105 ft and is mostly underlain by Cuyahoga Shale and therefore may provide a separation of the water table and liner per 40 CFR 761.75(b)(3). This area does not contain any buildings or structures except for the X-114A Outdoor Firing Range, which is slated for D&D early. There are four small jurisdictional wetlands that lie along the edge of the site, three along the northern boundary and one at the southern boundary at the northern edge of the X-611B Sludge Lagoon. There are small tributaries that will be evaluated as part of this study. Areas of potential historical significance are located near this study area (e.g., cemetery, historic farmsteads), which may require additional archaeological survey.

A.4 PATH FORWARD

More information is being collected on each of the study areas presented in this appendix. This information will better answer questions about geologic conditions and extent of contamination. From this information, plus information gathered in a detailed walk down and results from preliminary waste acceptance criteria (WAC) calculations, inappropriate sites will be removed from further consideration. Also, the four sites will be evaluated using a Kepner-Tregoe decision analysis approach. Under this approach, siting criteria will be assigned weighting factors and each site will be given a numerical score to rank how it measures up against the criteria. Then, public and regulatory preferences will be considered in the siting selection. Using this approach, a final candidate site will be developed into the on-site disposal alternative for evaluation in the RI/FS. The DFF&O, which went into effect April 13, 2010, requires evaluation of at least one site (alternative or subalternative) that is fully compliant with no ARARs waived. If more than one site is still under consideration, subalternatives to the on-site alternative will be developed. These subalternatives would then be evaluated to identify one site for presentation in the RI/FS report and proposed plan (PP).

If an OSDC were the selected remedy, additional site characterization activities will be needed to collect data required for the design. Because the design of such a facility would be a lengthy process, the design would be conducted in parallel with the RI/FS process. If the off-site disposal alternative is selected, the design would stop at the 90% design effort. If the on-site disposal alternative is selected, the design would continue and be completed concurrently with the remedial action work plan. It is preferable that the best location for a potential OSDC be identified early in the design process. The siting analysis will also involve regulatory and stakeholder input.

If the OSDC is selected as the preferred alternative, the RI/FS report and PP would identify the preferred site and, if applicable, the benefit of its selection over other feasible locations evaluated in the RI/FS report. The record of decision (ROD) would identify the selected site.

A.5 REGULATORY AND COMMUNITY INTERFACE

DOE has discussed development of the screening methodology, siting criteria, and screening process with Ohio EPA. A technical meeting was held with Ohio EPA on January 19, 2010, to discuss development of the siting criteria. Regulator comments have been incorporated into the siting criteria and process.

Ohio EPA will continue to review project documents pursuant to the DFF&O, including the RI/FS report, PP, ROD, and any post-ROD documentation if the on-site disposal alternative is selected.

Public participation is integral to the this process. Soliciting public preference on the location of a potential OSDC is critical to the current evaluation of waste disposal alternatives at PORTS. The general siting approach and considerations have been discussed at a Site Specific Advisory Board (SSAB) meeting and recommendations from the SSAB on siting an on-site landfill have been received (the PORTS SSAB also has a subcommittee that is focused on site waste disposition). The SSAB recommended the following criteria be considered in siting a potential OSDC:

- Possible use of multiple smaller cells
- Ensure minimal footprint/waste minimization/recycling
- Reuse existing landfills if possible

- Areas not conducive for reuse should be considered
- Consider impact on cultural resources
- Blend with existing terrain
- No off-site waste accepted
- Community benefit-land use management plans should be developed
- Cells should be latest cell technology
- Additional education for community members
- Complimentary use of cell space (solar panels, wind farms, etc.)
- Industrial use clean-up standard.

A special public meeting will be held to present details of the candidate sites, screening criteria and methodology, and the results. Community involvement will be important in the siting analysis and decision to determine the best location of an OSDC should the on-site disposal alternative be selected in the Sitewide Waste Disposition Evaluation ROD. Community feedback will also be solicited on the design and WAC of a potential OSDC.

The public will have additional opportunities for input to the site-selection process, including review of documentation. The PP will present the alternatives evaluated, including the recommended location for a disposal facility if the on-site disposal alternative is selected. The public will also have an opportunity to formally comment on the PP. Public comments could result in modification of the preferred alternative in the ROD, including a change in the on-site versus off-site disposal decision or modifications to the recommended location of an OSDC.

A.6 REFERENCES

BJC 2003a, *Identification and Screening of Candidate Sites for a Potential On-Site Waste Disposal Facility at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* BJC/PORTS-448, Bechtel Jacobs Company, LLC, April.

BJC 2003b, *Waste Volume/Characteristics Inventory for the Evaluation of a Potential On-Site Waste Disposal Facility at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, BJC/PORTS-449, Bechtel Jacobs Company, LLC, April.

Frederick, Carrie and Michael Angle 2003, *Ground Water Pollution Potential of Pike County, Ohio,* Ground Water Pollution Potential Report No. 29, Ohio Department of Natural Resources, Division of Water, Water Resources Section.

Ohio EPA 2011, *Director's Final Findings and Orders – Modification of April 13, 2010, Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project),* Ohio Environmental Protection Agency, September 12.

TPMC 2006, *Conceptual Design Report for the Decontamination and Decommissioning Project at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* TPMC/PORTS-81/R1, Theta Pro2Serve Management Company, LLC, September.

APPENDIX B: PRELIMINARY IDENTIFICATION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO-BE-CONSIDERED GUIDANCE FOR THE SITEWIDE WASTE DISPOSITION EVALUATION PROJECT

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ACRONYMS

ARAR	applicable or relevant and appropriate requirement
CAA	Clean Air Act of 1970
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	*Code of Federal Regulations*
D&D	decontamination and decommissioning
DFF&O	*Director's Final Findings and Orders – Modification of April 13, 2010, Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project)*
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
LMES	Lockheed Martin Energy System
LPP	LATA/Parallax Portsmouth, LLC
NCP	National Oil and Hazardous Substances Contingency Plan
NRHP	National Register of Historic Places
OAC	*Ohio Administrative Code*
Ohio EPA	Ohio Environmental Protection Agency
OHPO	Ohio Historic Preservation Office
PORTS	Portsmouth Gaseous Diffusion Plant
RCRA	Resource Conservation and Recovery Act of 1976, as amended
RI/FS	Remedial Investigation/Feasibility Study
TBC	to-be-considered (guidance)
TSCA	Toxic Substances Control Act of 1976

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B.1. INTRODUCTION

In accordance with the requirements of the *Director's Final Findings and Orders – Modification of April 13, 2010, Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project)* (DFF&O) and pursuant to Ohio's laws and regulations, and utilizing 40 *Code of Federal Regulations* (*CFR*) Sect. 300.430(f)(1)(ii)(B) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as a framework, entirely on-site remedial actions are required to attain applicable or relevant and appropriate requirements (ARARs), unless waived in accordance with the DFF&O and consistent with 40 *CFR* 300.430(f)(1)(ii)(C). The ARARs include only federal and state environmental or facility siting laws/regulations; they do not include occupational safety or worker radiation protection requirements. Additionally, per the DFF&O and 40 *CFR* 300.400(g)(3), substantive requirements of other advisories, criteria, or guidance may be considered in determining remedies (to-be-considered [TBC] guidance). The ARARs and TBCs that are anticipated to apply to the waste management activities and waste facility operations being evaluated under the preliminary remedial alternatives are listed below.

Paragraph 9.a of the DFF&O provides that "portions of response actions conducted entirely on-site pursuant to Work Plans or plans concurred with or approved by the Ohio Environmental Protection Agency (Ohio EPA) under the Order can be conducted pursuant to Section 121(e)(1) of CERCLA, 42 USC Section 9621." Section 121(e)(1) specifically provides that no federal, state, or local permit shall be required for the portion of any removal or remedial action conducted entirely as an on-site response action. In addition to "permits", the U.S. Environmental Protection Agency (EPA) has interpreted this section broadly to cover: "all administrative provisions from other laws, such as recordkeeping, consultation, and reporting requirements. In other words, administrative requirements do not apply to on-site response actions." (EPA 1998). Those portions of the remedial action that are taken off site are subject to both the substantive and administrative requirements of applicable laws. Only the substantive requirements in the ARARs and TBCs in the tables in this appendix shall be binding for entirely on-site actions.

ARARs are typically divided into three groups: (1) chemical-specific, (2) location-specific, and (3) action-specific. Tables B.1 and B.2 group the ARARs/TBCs for the on-site and off-site disposal alternatives, respectively. Both location- and action-specific ARARs/TBCs are included in Table B.1 (on-site disposal). Only action-specific ARARs/TBCs are included in Table B.2 (off-site disposal) because the scope of the action includes only the coordination of the preparation (treatment, as necessary, and packaging) and transport (shipping) of wastes to appropriate off-site disposal facilities. There were no chemical-specific ARARs identified for either alternative. In some cases, the conditions associated with the prerequisite requirements have not been confirmed to be present; if the subject condition is encountered during implementation of the action, then the specified ARAR would be triggered. A brief description of key ARAR/TBC topics follows.

Tables B.1 and B.2 are presented as draft. DOE and Ohio EPA will work together to finalize the ARARs.

B.2. CHEMICAL-SPECIFIC ARARS/TBCS

Chemical-specific ARARs provide health- or risk-based concentration limits or discharge limitations in various environmental media (i.e., surface water, groundwater, soil, and air) for specific hazardous substances, pollutants, or contaminants. Because this action is not addressing cleanup decisions for contaminated environmental media, chemical-specific ARARs and TBCs are not identified at this stage.

B.3. LOCATION-SPECIFIC ARARS/TBCS

Location-specific requirements establish restrictions on permissible concentrations of hazardous substances or establish requirements for how activities will be conducted because they are in special locations (e.g., wetlands, floodplains, critical habitats, streams). Sensitive resources identified at candidate sites under the on-site disposal alternative will be protected in accordance with the location-specific ARARs and TBCs listed in Table B.1, as appropriate.

B.3.1 FLOODPLAINS AND WETLANDS

Wetlands, floodplains, and aquatic resources are present on the Portsmouth Gaseous Diffusion Plant (PORTS) site. None of the candidate sites are located within a 100- or 500-year floodplain and none of the planned activities are expected to impact floodplain areas. Three small wetlands, including jurisdictional wetlands, have been identified at candidate Site B. Site C includes three very small ponds with acreages of 0.093, 0.066, and 0.037 (total area of 0.196 acres). These resources will be appropriately protected in accordance with the location-specific ARARs and TBCs identified in Table B.1, as appropriate. Activities will be designed to avoid or minimize impacts to wetlands. In the event wetlands would be impacted, mitigation activities would be incorporated into facility design where such impact occurs.

B.3.2 THREATENED AND ENDANGERED SPECIES

A sitewide threatened and endangered species survey completed in 1996 identified a number of potentially suitable habitats at PORTS for Federal- and State of Ohio-listed threatened, and endangered species, although only one State-listed plant species was actually observed (Lockheed Martin Energy Systems, Inc. [LMES] 1997). None of the identified habitats or species is located within the proposed candidate sites and proposed activities are not expected to impact such species or habitats. Therefore, ARARs for protection of these resources are not included in Table B.1.

B.3.3 CULTURAL RESOURCES

Cultural resources include prehistoric or historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. When these resources meet any one of the National Register Criteria for Evaluation (36 *CFR* Part 60.4), they may be termed historic properties and thereby are eligible for inclusion on the National Register of Historic Places (NRHP).

To identify archaeological resources located within the PORTS boundary, a systematic Phase I archaeological survey of the plant was conducted in 1996-1997 (Schweikart, J. F. et al 1997). Based on the results of the Phase I archaeological survey at PORTS, it has been determined that all of the area within Perimeter Road was disturbed during plant construction. As a result, environmental management activities taking place inside Perimeter Road will have no effect on archaeological resources listed in or eligible for listing in the NRHP. The Phase I survey also identified 13 historic-era farmsteads that were recommended for Phase II surveys to determine National Register eligibility, and a Phase II survey of a site (33-Pk-210) with prehistoric components. The U.S. Department of Energy (DOE) has completed the archaeological survey of 33-Pk-210 and it was determined that the portion of the site on DOE property was not eligible. Phase II surveys of the farmsteads are underway at this time. The farmstead evaluation is seeking to determine both the individual and collective national register eligibility.

The project area (area of potential effects) for the waste disposition project consists of three areas within the PORTS site. The proposed undertakings associated with the waste disposition project consist of characterization and, should it be determined to be the preferred alternative, siting of a disposal cell.

Due to the disturbed nature of the area within Perimeter Road, no additional archaeological support activities are proposed. For areas outside of Perimeter Road, information on historic-era farmsteads, cemeteries, churches and other potentially historic properties will be made available to the project team so that characterization activities are designed to avoid these cultural resources.

Archaeological surveys will be conducted as a part of project planning and design in areas where they have not already occurred and where on-site disposal cell siting is being considered. The surveys will be designed to identify eligible archaeological resources in the proposed facility siting areas (the areas of potential effect). Ohio Historic Preservation Office (OHPO)-recognized and accepted methods will be used. If a proposed undertaking has the potential to adversely affect eligible archaeological resources, alternative means will be evaluated that would either avoid or minimize adverse effects to the resources. If avoidance or minimization is not possible, DOE will coordinate with OHPO on the development of a treatment (mitigation) strategy. Treatment measures would be conducted pursuant to the strategy for the locations with NRHP-eligible resources prior to the implementation of on-site disposal cell siting efforts. DOE will provide for the inclusion of professional archaeologists on the project team to assist in the siting of a cell and to provide field support at the time of project implementation. Should previously unidentified archaeological resources be accidentally discovered during characterization, siting or construction phases, the team archaeologist will identify, record, and salvage items and make appropriate notifications. Additional details on the protection of historic properties in the implementation stage of cell siting will be included in the Remedial Investigation/Feasibility Study (RI/FS) that will be issued for public review in the future.

In addition to the approach described above for the identification, evaluation, and necessary consideration of avoidance, minimization or mitigation of adverse effect to any identified historic archaeological properties, DOE has also proposed a comprehensive interpretation effort for the DOE-built environment at PORTS. The comprehensive measures are found in the RI/FS Work Plan for the Process Buildings and Complex Facilities Decontamination and Decommissioning (D&D) Evaluation Project.

B.4. ACTION-SPECIFIC ARARS/TBCS

Action-specific ARARs include operation, performance, and design requirements or limitations based on the waste types, media, and removal/remedial activities.

B.4.1 NO ACTION ALTERNATIVE

Pursuant to EPA guidance, there are no ARARs for a No Action alternative (EPA 1991).

B.4.2 ON-SITE DISPOSAL ALTERNATIVE

The action-specific ARARs and TBCs identified in Table B.1 address design, construction, operation, closure, and post-closure care for the preliminary on-site disposal alternative. These include landfill design and operation requirements under the Toxic Substances Control Act of 1976 (TSCA) and Subtitle C of the Resource Conservation and Recovery Act of 1976, as amended (RCRA), DOE Order 435.1-1 requirements for low-level (radioactive) waste disposal facilities, and Clean Air Act of 1970 (CAA) requirements for asbestos-containing materials disposal facilities.

All primary wastes (e.g., wastes sent to the facility for disposal) and secondary wastes (e.g., contaminated personal protective equipment, decontamination wastes) generated during facility construction and operation activities must be appropriately characterized and managed in accordance with appropriate state

of Ohio laws and regulations for hazardous and solid waste, federal TSCA, DOE Orders[2], and CAA requirements, and other requirements as specified in the table. Long-term storage of waste would not be anticipated. Hazardous waste determinations will be made based on available process knowledge and sampling/analysis results. Hazardous and other waste may be accumulated and stored in appropriate storage areas at PORTS.

Wastewater will likely need to be treated for volatile organic compounds, which may be done on site at a newly constructed wastewater treatment unit, and may be discharged to surface water via a newly established outfall(s) and in compliance with appropriate outfall limits established in consultation with Ohio EPA to ensure surface water quality standards are not exceeded. Water treatment ARARs are included in Table B.1 to address the potential of a new unit and outfall(s). It is assumed that the wastewater treatment system would emit less than ten pounds per day of air contaminants in compliance with the de minimis emission limits of the *Ohio Administrative Code* (*OAC)* 3745-15-05(B). This will be evaluated further as the remedial design progresses.

It is anticipated that an on-site disposal facility would have some capability to treat waste to meet physical or analytic waste acceptance criteria. Specific treatment technologies are described in Sect. 4.4.3.4 of the RI/FS Work Plan and will be evaluated further in the RI/FS. An on-site disposal facility would be responsible for any necessary treatment and/or off-site transport of wastes it generates during facility operations that could not meet the waste acceptance criteria for on-site disposal.

The requirements for a TSCA chemical waste landfill in 40 *CFR* Sect. 761.75 would be potential ARARs for disposal of such wastes in an on-site disposal facility. The TSCA chemical waste landfill design requirements generally follow the RCRA landfill design requirements. TSCA, however, specifies that if a synthetic liner is used, it must have a minimum thickness of 30 millimeters. In addition, TSCA specifies that the bottom of the liner must be located 50 ft above the historical, high groundwater mark and must prohibit any hydrologic connection between the site and any surface water, 40 *CFR* Sect. 761.75(b)(3).

In accordance with the DFF&O, the RI/FS will evaluate at least one alternative or sub-alternative that is fully ARARs compliant with no ARARs waived.

B.4.3 OFF-SITE DISPOSAL ALTERNATIVE

The off-site disposal alternative consists of treating (as necessary), packaging, shipping and disposal of all anticipated CERCLA waste to appropriately licensed and permitted off-site disposal facilities. Coordination of the preparation and transport of wastes to appropriate off-site disposal facilities would be the responsibility of the Waste Disposition project.

Substantive requirements (i.e., ARARs) apply by law only to entirely on-site CERCLA response actions. As noted in the DFF&O Paragraph 9.a, the NCP at 40 *CFR* 300.400(e)(1) defines “on-site” as meaning “the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for the implementation of the response action.” Off-site disposal, by definition, is not an on-site response action and is subject to all substantive, procedural, and administrative requirements of all legally applicable laws but not to any requirements that might normally be labeled relevant and appropriate under the ARARs process.

Any wastes transferred off site or transported in commerce along public right-of-ways must meet the requirements summarized on Table B.2, depending on the type of waste (e.g., hazardous, low-level,

[2] DOE Orders are internal regulations that are legally binding to DOE contractors but are not considered by EPA to be ARARs because they have not been formally promulgated through a rulemaking process. DOE Orders, however, are functionally equivalent to many of the corresponding federal and state regulations.

mixed, or solid waste). These requirements include packaging, labeling, marking, manifesting, and placarding for hazardous materials in accordance with 49 *CFR* 170-180 *et seq.* Transport of D&D wastes along roads within the PORTS site must meet the requirements of the *Transportation Safety Document for the On-site Transfer of Hazardous Material at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (LATA/Parallax Portsmouth, LLC [LPP] 2008).

In addition, EPA in 40 CFR 300.440 requires that the off-site transfer of any hazardous substance, pollutant, or contaminant generated during CERCLA response actions be to a treatment, storage, or disposal facility that complies with applicable federal and state laws and has been approved by EPA for acceptance of CERCLA waste (see also the “Off-Site Rule” at 40 *CFR* 300.440 *et seq.*). Accordingly, DOE will verify with the appropriate EPA regional contact that any needed off-site facility is acceptable for receipt of these D&D wastes before transfer.

B.5. REFERENCES

EPA 1998, *RCRA, Superfund & EPCRA Hotline Training Module: Introduction to Applicable or Relevant and Appropriate Requirements*, Updated February, 1998, EPA/540-R-98-020, OSWER Directive 9205.5-10A, U.S. EPA, Office of Solid Waste and Emergency Response, Washington, D.C., June.

EPA 1991, *ARARs Q’s and A’s: General Policy, RCRA, CWA, SDWA, Post-ROD Information, and Contingent Waivers*, OSWER Directive 9234.2-01FS-A, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C., June.

LMES 1997, *Final Threatened and Endangered Species Report,* DOE/OR/11-1668&D0 and POEF-LMES-166, Lockheed Martin Energy Systems, Inc., Piketon, OH.

LPP 2008, *Transportation Safety Document for the On-site Transfer of Hazardous Material at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* LPP-0021/R3, LATA/Parallax Portsmouth, LLC.

Schweikart, J. F. et al 1997, *Phase I Archaeological Survey for the Portsmouth Gaseous Diffusion Plant (PORTS Facility) in Scioto and Seal Townships, Pike County, Ohio,* ASC Group, Columbus, OH.

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Media/Location/Action	Requirements[a]	Prerequisite	Citation
	Location-specific ARARs		
	Wetlands		
Presence of wetlands as defined in 10 *CFR* 1022.4	Avoid, to the extent possible, the long- and short-term adverse effects associated with destruction, occupancy, and modification of wetlands.	DOE actions that involve potential impacts to, or take place within, wetlands—**applicable**	10 *CFR* 1022.3(c)
	Take action, to extent practicable, to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.		10 *CFR* 1022.3(a)(7) and (8)
	Undertake a careful evaluation of potential effects of any new construction in wetlands. Identify, evaluate, and, as appropriate, implement alternative actions that may avoid or mitigate adverse impacts on wetlands.		10 *CFR* 1022.3(b) and (d)
	Measures to take to mitigate the adverse effects of actions in wetlands include, but are not limited to, minimum grading requirements, run-off controls, design and construction constraints, and protection of ecology-sensitive areas.		10 *CFR* 1022.13(a)(3)
	If no practicable alternative to locating or conducting the action in the wetland is available, then before taking action, design or modify the action in order to minimize potential harm to or within the wetland, consistent with the policies set forth in Executive Order 11990.		10 *CFR* 1022.14(a)
Presence of jurisdictional wetlands	Except as provided under the CWA Sect. 404(b)(2), no discharge of dredged or fill material into an aquatic ecosystem is permitted if there is a practicable alternative that would have less adverse impact on the aquatic ecosystem or if it will cause or contribute to significant degradation of the waters of the U.S.	Actions that involve the discharge of dredged or fill material into waters of the U.S., including jurisdictional (adjacent) wetlands—**applicable**	40 *CFR* 230.10(a) and (c)
	Except as provided under the CWA Sect. 404(b)(2), no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps in accordance with 40 *CFR* 230.70 *et seq*. are taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.		40 *CFR* 230.10(d)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Presence of wetlands as defined under *OAC* 3745-1-02(B)(90)	Wetlands designated uses, as assigned in accordance with *OAC* 3745-1-54(B)(2), shall be maintained and protected such that degradation of surface waters through direct, indirect, or cumulative impacts does not result in the net loss of wetland acreage or functions in accordance with the substantive wetland avoidance, minimization, and compensatory mitigation requirements of the paragraphs (D) and (E) of *OAC* 3745-1-54.	Activity that would cause loss of wetlands as defined under *OAC* 3745-1-02(B)(90)—**applicable**	*OAC* 3745-1-54(B)(1) *OAC* 3745-1-51 through -54
Presence of "isolated" wetlands as defined under *RC* 6111.02	No person shall engage in the filling of an isolated wetland unless authorized to do so pursuant to the substantive requirements of a general or individual state isolated wetland permit.	Actions that involve the discharge of dredged or fill material into "isolated wetlands"—**applicable**	*RC* 6111.021 – 6111.028
	Must comply with the following substantive requirements and conditions of this permit: • Only suitable material free of toxic contaminants in other than trace quantities shall be used as fill material. • Use of asphalt and rubber tires as fill is prohibited. • Wetland narrative and chemical criteria in OAC 3745-1-51 and 3745-1-52 shall be maintained in isolated wetlands wholly or partially avoided. • Visible signage, as detailed in the general permit, shall be placed around the delineated boundary of the avoided wetlands.	Category 1 or 2 "isolated wetlands" of a total of ½ acre or less—**TBC**	Ohio General Permit for Filling Category 1 and Category 2 Isolated Wetlands (effective April 10, 2007)
	Mitigation is required either on or off site, or at a mitigation bank within the same U.S. Army COE district as the project location. Mitigation must be conducted in accordance with the ratios established in the general permit depending on the wetland category designation. The mitigation site shall be protected in perpetuity, and appropriate practicable management measures including vegetative buffers shall be implemented to restrict harmful activities that jeopardize the mitigation.	Actions that involve the discharge of dredged or fill material into Category 1 or 2 "isolated wetlands" of a total of ½ acre or less—**TBC**	Ohio General Permit for Filling Category 1 and Category 2 Isolated Wetlands (effective April 10, 2007)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
	Aquatic resources		
Location encompassing aquatic ecosystem as defined in 40 *CFR* 230.3(c)	Except as provided under Sect. 404(b)(2), no discharge of dredged or fill material into an aquatic ecosystem is permitted if there is a practicable alternative that would have less adverse impact on the aquatic ecosystem or if it will cause or contribute to significant degradation of the waters of the U.S.	Action that involves discharge of dredged or fill material into waters of the U.S.—**applicable**	40 *CFR* 230.10(a) and (c) *OAC* 3745-32-05
	Except as provided under Sect. 404(b)(2), no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps in accordance with the substantive provisions of 40 *CFR* 230.70 *et seq*. are taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.		40 *CFR* 230.10(d) *OAC* 3745-32-05
	Cultural resources		
Presence of archaeological resources	Must provide for the preservation of significant historical and archeological data which might otherwise be irreparably lost or destroyed as a result of any alteration of terrain caused as a result of any federal construction project.	Federal construction projects that would cause the irreparable loss or destruction of significant historical or archeological resources or data—**applicable**	16 USC 469
Presence of human remains, funerary objects, sacred objects, or objects of cultural patrimony for Native Americans	Must stop activities in the area of the discovery and take reasonable effort to secure and protect the objects discovered before resuming activity.	Federal agency construction activities that inadvertently discover Native American cultural items on federal lands—**applicable**	25 USC 3002(d) 43 *CFR* 10.4(c) and (d)(2)
Presence of historic resources	Federal agencies must take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register.	Federal agency undertaking that may impact historic properties listed or eligible for inclusion on the National Register of Historic Places—**applicable**	16 USC 470f 36 *CFR* 800.1(a)
Presence of historic resources	Federal agencies must initiate measures to assure that where, as a result of Federal action, a historic property is to be substantially altered or demolished, timely steps are taken to make or have made appropriate records.	Substantial alterations or demolition of a historic property—**applicable**	16 USC 470h-2(b)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
	Action-specific ARARs		
	Disposal Site Suitability Requirements		
Siting Criteria Document Requirements	A hazardous waste facility installation and operation permit cannot be approved unless it is proven that the facility:	Construction of a RCRA hazardous waste landfill—**applicable**	*OAC* 3745-50-38(A)
	• Complies with the hazardous waste standards		*OAC* 3745-50-38(A)(2)
	• Represents the minimum adverse environmental impact, considering the state of available technology and the nature and economics of various alternatives.		*OAC* 3745-50-38(A)(3)
	• Represents the minimum risk of all of the following: (i) fires or explosions from TSD methods; (ii) release of hazardous waste during transportation to or from facility; (iii) adverse impact on the public health and safety.		*OAC* 3745-50-38(A)(4)(a) – (c)
	• Must not be located within the boundaries of a state park or state park purchase area or national park or recreation area or national park candidate area.		*OAC* 3745-50-38(A)(7)
Siting of RCRA hazardous waste landfill	Portions of new facilities where treatment, storage, or disposal of hazardous waste will be conducted shall not be located within 61 meters (approximately 200 ft) of a fault that had displacement in Holocene time.	Construction of a RCRA hazardous waste landfill—**applicable**	40 *CFR* 264.18 *OAC* 3745-54-18(A)(1)
Siting of a TSCA landfill	The landfill must be located above the historical high groundwater table. The bottom of the landfill liner shall be at least 50 ft above the historical high water table. Floodplains, shorelands, and groundwater recharge areas shall be avoided. There shall be no hydraulic connection between the site and standing or flowing surface water.	Construction of a TSCA chemical waste landfill—**applicable**	40 *CFR* 761.75(b)(3)
	Shall provide diversion structures capable of diverting all surface water run-off from a 24-hour, 25-year storm.	Construction of a TSCA chemical waste landfill above the 100-year floodwater elevation—**applicable**	40 *CFR* 761.75(b)(4)(ii)
	The landfill site shall be located in an area of low to moderate relief to minimize erosion and to help prevent landslides or slumping.	Construction of a TSCA chemical waste landfill—**applicable**	40 *CFR* 761.75(b)(5)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Siting of a TSCA landfill (continued)	The landfill will not present an unreasonable risk of injury to health or the environment from PCBs when one or more of the requirements of 40 *CFR* 761.75(b) are not met, these requirements may be waived.		40 *CFR* 761.75(c)(4)
Siting of a LLW disposal facility	Proposed locations for low-level waste facilities shall be evaluated considering environmental characteristics, geotechnical characteristics, and human activities, including whether it is located in a floodplain, a tectonically active area, or in a zone of water table fluctuation.	Construction of a LLW disposal facility—**TBC**	DOE M 435.1-1(IV)(M)(3)(a)(2)
	Proposed locations with environmental and geotechnical characteristics, and human activities for which adequate protection cannot be provided through the facility design shall be deemed unsuitable for location of the facility.		DOE M 435.1-1(IV)(M)(3)(b)
	Site preparation, construction, and excavation activities		
Activities causing release of air pollutants	Shall not cause the emission or escape into the open air from any source or sources whatsoever, of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors, or any other substances or combinations of substances, in such manner or in such amounts as to endanger the health, safety, or welfare of the public, or cause unreasonable injury or damage to property.	Activities causing the release of air pollution nuisances as defined in *OAC* 3745-15-07(A)—**applicable**	*OAC* 3745-15-07
	The operation of a hazardous waste facility shall not cause, permit or allow the emission of any particulate matter, dust, fumes, gas, mist, smoke, or vapor or odorous substance that unreasonably interferes with the comfortable enjoyment of life and property by persons living or working in the vicinity of the facility or that is injurious to public health.	Site where hazardous waste will be managed such that air emissions may occur—**applicable**	*RC* 3734.02(I)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Activities causing fugitive dust (particulate) emissions	Shall take reasonable achievable control measures to prevent particulate matter from becoming airborne. Reasonable achievable control measures shall include, but are not limited to, the following:	Fugitive emissions from transportation, land-disturbing, or building alteration activities located in areas identified in Appendix A to *OAC* 3745-17-08, except as exempted under *OAC* 3745-17-08(A)(3)—**relevant and appropriate**	*OAC* 3745-17-08(B)
	• Use, where possible, of water or chemicals for control of dust and in demolition of existing buildings or structures, construction operations, grading of roads, or the clearing of land.		*OAC* 3745-17-08(B)(1)
	• Periodic application of asphalt, oil (excluding used oil), water, or other suitable chemicals on dirt or gravel roads and parking lots, materials stock piles, and other surfaces which can create airborne dusts, or the use of canvas or other suitable coverings for all materials stockpiles and stockpiling operations except temporary stockpiles.		*OAC* 3745-17-08(B)(2) and (6)
	• Install and use hoods, fans, and other equipment to adequately enclose, contain, capture, vent, and control the fugitive dust at the point(s) of capture to the extent possible with good engineering design. Equipment must meet the efficiency requirements of *OAC* 3745-17-08(B)(3)(a) and (b).		*OAC* 3745-17-08(B)(3)
	• Use of adequate containment methods during sandblasting or similar operations.		*OAC* 3745-17-08(B)(5)
	• Cover, at all times, open-bodied vehicles when transporting materials likely to become airborne.		*OAC* 3745-17-08(B)(7)
	• Pave and maintain roadways in a clean condition.		*OAC* 3745-17-08(B)(8)
	• Promptly remove, in such a manner as to minimize or prevent resuspension, earth or other material from paved streets onto which this material has been deposited by trucking or earth moving equipment or erosion by water or other means.		*OAC* 3745-17-08(B)(9)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Activities causing storm water run-off	Dischargers must utilize best management practices to control pollutants in storm water discharges during and after construction, which may include, as appropriate, soil stabilization practices (e.g., seeding); perimeter structural practices (e.g., gabions, silt fences, sediment traps); and storm water management devices as detailed in Part III.G.2 (“Controls”) of NPDES OHC000003.	Storm water run-off discharges from land disturbed by construction activity —disturbance of ≥ 1 acre total, except where otherwise exempt as specified in 40 *CFR* 122.26(b)(15) —**applicable**	Authorization for Storm Water Discharges Associated with Construction Activity under NPDES OHC000003, Part III.G.2
Activities causing radionuclide emissions	Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive an EDE of 10 mrem per year.	Radionuclide air emissions from DOE facilities— **applicable**	40 *CFR* 61.92
Radiation protection of the public and the environment	Except as provided in 458.1(4)(c), exposure to individual members of the public from radiation shall not exceed a total EDE of 0.1 rem/year (100 mrem/year), an equivalent dose to the lens of the eye exceeding 1500 mrem/year, or an equivalent dose to the skin or extremities exceeding 5000 mrem/year, exclusive of the dose contributions from background radiation, any medical administration the individual has received, or voluntary participation in medical/research programs.	Release of radionuclides to the environment from all sources of ionizing radiation and exposure pathways at a DOE facility that could contribute significantly to the total dose —**TBC**	DOE Order 458.1(4)(b) and (c)
	Shall use, to the extent practicable, procedures and engineering controls based on sound radiation protection principles to achieve doses to members of the public that are ALARA.		DOE Order 458.1(4)(d)
	Must not exceed 3 pCi/L annual average Rn-220 and Rn-222 concentration, not including background, at the site boundary if DOE activities release Rn-220 and Rn-222 or their decay products.	DOE activities that release Rn-220 and Rn-222 or their decay products—**TBC**	DOE Order 458.1(4)(f)(5)
	Management, storage, and disposal must be conducted in a manner such that exposure to members of the public to radiation from radioactive waste complies with ALARA process requirements and does not exceed a TED of 25 mrem in a year from all exposure pathways and radiation sources associated with the waste, except for transportation and radon and its decay products.	Management, storage, and disposal of low-level radioactive waste—**TBC**	DOE Order 458.1(h)(1)(c)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
	Design, construction, and operation of a landfill		
Design of a RCRA hazardous waste facility	Facilities must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or nonsudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.	Construction of a RCRA hazardous waste facility—**applicable**	40 *CFR* 264.31 *OAC* 3745-54-31
Liner and leachate collection design for a RCRA landfill	Must install two or more liners and a leachate collection and removal system above and between such liners.	Construction of a RCRA hazardous waste landfill—**applicable**	40 *CFR* 264.301(c) *OAC* 3745-57-03(C)
Liner	The liner system must include a:		40 *CFR* 264.301(c)(1)(i) *OAC* 3745-57-03(C)(1)(a)
	Top liner, designed and constructed of materials (e.g., geomembrane) to prevent the migration of hazardous constituents into the liner during active life and the post-closure period; and a		40 *CFR* 264.301(c)(1)(i)(A) *OAC* 3745-57-03(C)(1)(a)(i)
	Composite bottom liner consisting of at least two components: • Upper component must be designed and constructed of materials to prevent migration of hazardous constituents into component during active life and post-closure period. • Lower component constructed of at least 3 ft of compacted soil material with a hydraulic conductivity of no more than 1×10^{-7} cm/second.		40 *CFR* 264.301(c)(1)(i)(B) *OAC* 3745-57-03(C)(1)(a)(ii)
	Liners must comply with Paragraphs (a)(1)(i), (ii), and (iii) of this section, which states that the liner must be:		40 *CFR* 264.301(c)(1)(ii) *OAC* 3745-57-03(C)(1)(b)
	• Constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure due to pressure gradients, physical contact with the waste or leachate to which they are exposed, climatic conditions, or stress from installation or daily operation.		40 *CFR* 264.301(a)(1)(i) *OAC* 3745-57-03(A)(1)(a)
	• Placed on a foundation or base capable of supporting the liner and resistance to the pressure gradients above and below the liner to prevent failure of the liner due to settlement, compression or uplift.		40 *CFR* 264.301(a)(1)(ii) *OAC* 3745-57-03(A)(1)(b)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Liner and leachate collection design for a RCRA landfill (continued)	• Installed to cover all areas likely to be in contact with the waste or leachate.		40 *CFR* 264.301(a)(1)(iii) *OAC* 3745-57-03(A)(1)(c)
Top leachate collection and removal system	Must be designed, constructed, operated, and maintained to collect and remove leachate from the landfill during the active life and post-closure period and ensure that the leachate depth over the liner does not exceed 30 cm, and comply with Paragraphs (c)(3)(iii) and (iv) of this section.	Construction of a RCRA hazardous waste landfill—**applicable**	40 *CFR* 264.301(c)(2) *OAC* 3745-57-03(C)(2)
	Leachate collection and removal system must be constructed of materials that are: • Chemically resistant to waste managed in landfill and leachate generated. • Of sufficient strength and thickness to prevent collapse under pressures exerted by overlying wastes, waste cover materials, and any equipment used.		40 *CFR* 264.301(c)(3)(iii) *OAC* 3745-57-03(C)(3)(c)
	Must be designed and operated to minimize clogging during the active life of the facility and post-closure care period of the landfill.		40 *CFR* 264.301(c)(3)(iv) *OAC* 3745-57-03(C)(3)(d)
Bottom leachate collection and removal system/leak detection system	Leachate collection and removal system must be capable of detecting, collecting, and removing leaks of hazardous constituents at the earliest practicable time through all areas of the top liner likely to be exposed to waste or leachate during the active life and post-closure care period. Requirements for a leak detection system are satisfied by installation of a system that is:	Construction of a RCRA hazardous waste landfill—**applicable**	40 *CFR* 264.301(c)(3) *OAC* 3745-57-03(C)(3)
	• Constructed with a bottom slope of 1 percent or more.		40 *CFR* 264.301(c)(3)(i) *OAC* 3745-57-03(C)(3)(a)
	• Constructed of granular drainage materials with a hydraulic conductivity of 1×10^{-2} cm/second and a thickness of 12 in. or more or synthetic or geonet drainage materials with a transmissivity of 3×10^{-5} m^2/second.		40 *CFR* 264.301(c)(3)(ii) *OAC* 3745-57-03(C)(3)(b)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Bottom leachate collection and removal system/leak detection system (continued)	• Constructed of materials that are chemically resistant to waste managed and expected leachate to be generated, and structurally sufficient to resist pressures exerted by waste, cover, and equipment used at the landfill;		40 *CFR* 264.301(c)(3)(iii) *OAC* 3745-57-03(C)(3)(c)
	• Designed and operated to minimize clogging during the active life of the facility and post-closure care period.		40 *CFR* 264.301(c)(3)(iv) *OAC* 3745-57-03(C)(3)(d)
	• Constructed with sumps and liquid removal methods (e.g., pumps) of sufficient size to collect and remove liquids from the sump and prevent liquids from backing up. Each unit must have its own sump(s). The design of each sump and removal system must provide a method for measuring and recording the volume of liquids present in the sump and of liquids removed.		40 *CFR* 264.301(c)(3)(v) *OAC* 3745-57-03(C)(3)(e)
	If the leak detection system is not located completely above the seasonal high water table, a demonstration must be made that the operation of the system will not be adversely affected by groundwater.	Construction of a RCRA hazardous waste landfill—**applicable**	40 *CFR* 264.301(c)(5) *OAC* 3745-57-03(C)(5)
Monitoring of liners and cover systems during and after construction and installation	During construction or installation, liners and cover systems must be checked for uniformity, damage, and imperfections (e.g., holes, cracks, thin spots, etc.).	Construction and operation of a RCRA landfill—**applicable**	40 *CFR* 264.303(a) *OAC* 3745-57-05(A)
	Immediately after construction or installations, synthetic liners must be checked to ensure tight seams and joints and the absence of tears, punctures, or blisters; soil based and mixed liners and covers must be checked for imperfections, including lenses, cracks, channels, or other structural non-uniformities.		40 *CFR* 264.303(a)(1) - (2) *OAC* 3745-57-05(A)(1) – (2)
Liner design requirements for a TSCA landfill	Shall be located in thick, relatively impermeable formations such as large area clay pans. Where this is not possible, the soil shall have a high clay and silt content with the following parameters:	Construction of a TSCA chemical waste landfill—**applicable**	40 *CFR* 761.75(b)(1)
	• In place soil thickness, 4 ft or compacted soil liner thickness, 3 ft		40 *CFR* 761.75(b)(1)(i)
	• Permeability (cm/sec), equal to or less than 1×10^{-7}		40 *CFR* 761.75(b)(1)(ii)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Liner design requirements for a TSCA landfill (continued)	• Percent soil passing No. 200 sieve > 30		40 *CFR* 761.75(b)(1)(iii)
	• Liquid limit, > 30		40 *CFR* 761.75(b)(1)(iv)
	• Plasticity index > 15		40 *CFR* 761.75(b)(1)(v)
	Synthetic membrane liners shall be used when the hydrologic or geologic conditions at the landfill require such a liner in order to provide at least a permeability equivalent to that of the soils. A synthetic liner should be chemically compatible with PCBs.		40 *CFR* 761.75(b)(2)
	Adequate soil underlining and cover shall be provided to prevent excessive stress or rupture of the liner. The liner must have a minimum thickness of 30 mils.		
Leachate collection system for TSCA landfill	A leachate collection monitoring system shall be installed above the chemical waste landfill. An acceptable system includes compound leachate collection.	Construction of a TSCA chemical waste landfill—**applicable**	40 *CFR* 761.75(b)(7)
	Compound leachate collection system consists of a gravity flow drainfield installed above the waste disposal facility liner and above a secondary installed liner.		40 *CFR* 761.75(b)(7)(ii)
Siting, design, operation, and maintenance of a DOE LLW disposal facility	LLW disposal facilities shall be sited, designed, operated, maintained, and closed so that a reasonable expectation exists that the following performance objectives will be met:	Siting, design, operation, maintenance, and closure of DOE LLW disposal facility—**TBC**	DOE M 435.1-1(IV)(P)(1)
	Dose to representative members of the public shall not exceed 25 mrem in a year total effective dose equivalent from all exposure pathways, excluding the dose from radon and its progeny in air.		DOE M 435.1-1(IV)(P)(1)(a)
	Dose to representative members of the public via air pathway shall not exceed 10 mrem in a year total EDE, excluding the dose from radon and its progeny.		DOE M 435.1-1(IV)(P)(1)(b)
	Release of radon shall be less than an average flux of 20 pCi/m2/s (0.74 Bq/m2/s) at the surface of the disposal facility. Alternatively, a limit of 0.5 pCi/1 (0.0185 Bq/l) of air may be applied at the boundary of the facility.		DOE M 435.1-1(IV)(P)(1)(c)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Siting, design, operation, and maintenance of a DOE LLW disposal facility (continued)	Operating procedures must protect the public, workers, and the environment, ensure the security of the facility, minimize subsidence during and after waste placement, achieve long-term stability and minimize the need for long-term active maintenance, and meet the requirements of the closure/postclosure plan.	Operation of a LLW disposal facility at a DOE site—**TBC**	DOE M 435.1-1 (IV)(P)(6)(a)
	Permanent identification marks for disposal excavations and monitoring wells shall be emplaced.		DOE M 435.1-1 (IV)(P)(6)(b)
	Operations shall be conducted so that disposal operations do not have adverse effects on any other disposal unit low-level wastes.		DOE M 435.1-1 (IV)(P)(6)(d)
	Operations shall include a process for tracking and documenting low-level waste placement in the facility by generator source.		DOE M 435.1-1 (IV)(P)(6)(e)
Action leakage rate testing for the RCRA leachate detection system	The action leakage rate (maximum design flow rate that the leak detection system can remove without the fluid head on the bottom liner exceeding 1 ft) must include an adequate safety margin to allow for uncertainties in the design, construction, operation, and location of the leak detection system, waste and leachate characteristics, likelihood and amounts of other sources of liquids in the leak detection system, and proposed response actions (e.g., the action leakage rate must consider decreases in the flow capacity of the system over time resulting from siltation and clogging, rib layover, and creep of synthetic components of the system, overburden pressures, etc.).	Construction and operation of a RCRA hazardous waste landfill**—applicable**	40 *CFR* 264.302(a) *OAC* 3745-57-04(A)
	To determine if the action leakage rate has been exceeded, must convert the weekly or monthly flow rate from the monitoring data obtained under 40 *CFR* 264.303(c) to an average daily flow rate (gal/acre/day) for each sump. The average daily flow rate for each sump must be calculated weekly during the active life and closure period, and monthly during the post-closure period when monthly monitoring is required under 40 *CFR* 264.303(c).		40 *CFR* 264.302(b) *OAC* 3745-57-04(B)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Response actions for RCRA leachate detection system	Must develop actions to be taken if action leakage rate has been exceeded.	Operation of a RCRA landfill leak detection system—**applicable**	40 *CFR* 264.304(a) *OAC* 3745-57-06(A)
	If the flow rate into the leak detection system exceeds the action leakage rate for any sump, must determine:	Flow rate into the leak detection system exceeds action leakage rate for any sump—**applicable**	40 *CFR* 264.304 (b) *OAC* 3745-57-06(B)
	• To the extent practicable, the location, size, and cause of any leak.		40 *CFR* 264.304 (b)(3) *OAC* 3745-57-06(B)(3)
	• Whether waste receipt should cease or be curtailed, whether any waste should be removed from the unit for inspection, repairs, or controls, and whether or not the unit should be closed.		40 *CFR* 264.304 (b)(4) *OAC* 3745-57-06(B)(4)
	• Any other short-term and longer-term actions to be taken to mitigate or stop any leaks.		40 *CFR* 264.304 (b)(5) *OAC* 3745-57-06(B)(5)
	Must assess the source of liquids and amounts of liquids by source; conduct a fingerprint, hazardous constituent, or other analyses of the liquids in the leak detection system to identify the source of liquids and possible location of any leaks, and the hazard and mobility of the liquid; and assess the seriousness of any leaks in terms of potential for escaping into the environment; or document why such assessments are not needed.	Leak and/or remediation determinations required—**applicable**	40 *CFR* 264.304(c)(1) and (2) *OAC* 3745-57-06(C)(1) and (2)
Leachate collection system monitoring and handling	Leachate collection systems shall be monitored monthly for quantity and physicochemical characteristics of leachate produced. The leachate should be either treated to acceptable limits for discharge in accordance with legally applicable discharge limits or disposed of by another legally appropriate method. Water analysis shall be conducted as provided in Paragraph (b)(6)(iii) of 40 *CFR* 761.75.	Construction of a TSCA chemical waste landfill—**applicable**	40 *CFR* 761.75(b)(7)
Security and support facilities for TSCA chemical waste landfill	A 6-ft woven mesh fence, wall, or similar device shall be placed around the site to prevent unauthorized persons and animals from entering.	Construction of a TSCA chemical waste landfill—**applicable**	40 *CFR* 761.75(b)(9)(i)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Security system for a RCRA landfill	Roads shall be maintained to and within the site that are adequate to support the operation and maintenance of the site without causing safety or nuisance problems or hazardous conditions.		40 *CFR* 761.75(b)(9)(ii)
	Must prevent the unknowing entry, and minimize the possibility for the unauthorized entry, of persons or livestock onto the active portion of his facility, unless:	Construction and operation of a RCRA hazardous waste landfill—**applicable**	40 *CFR* 264.14 *OAC* 3745-54-14(A)
	• Physical contact with the waste, structures, or equipment within the active portion of the facility will not injure unknowing or unauthorized persons or livestock which may enter the active portion of a facility.		40 *CFR* 264.14(1) *OAC* 3745-54-14(A)(1)
	• Disturbance of the waste or equipment, by the unknowing or unauthorized entry of persons or livestock onto the active portion of a facility, will not cause a violation of the requirements of this part.		40 *CFR* 264.14(2) *OAC* 3745-54-14(A)(2)
	Must have a 24-hour surveillance system which continuously monitors and controls entry onto the active portion of the facility; or an artificial or natural barrier which completely surrounds the active portion of the facility; and a means to control entry, at all times, through the gates or other entrances to the active portion of the facility.		40 *CFR* 264.14(b) *OAC* 3745-54-14(B)
	Must post a sign with the legend "Danger – Unauthorized Personnel Keep Out" at each entrance to the active portion of a facility and at other locations in sufficient numbers to be seen from any approach in the active portion. Legend must be written in English and be legible from a distance of at least twenty-five feet.		40 *CFR* 264.14(c) *OAC* 3745-54-14(C)
Run-on/run-off control systems	A run-on control system must be designed, constructed, operated, and maintained that is capable of preventing flow onto the active portion of the landfill during peak discharge from at least a 25-year storm.	Construction and operation of a RCRA hazardous waste landfill—**applicable**	40 *CFR* 264.301(g) *OAC* 3745-57-03(G)
	Run-off management system must be able to collect and control the water volume from a run-off resulting from a 24-hour, 25-year storm event.		40 *CFR* 264.301(h) *OAC* 3745-57-03(H)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Run-on/run-off control systems (continued)	Collection and holding facilities must be emptied or otherwise expeditiously managed after storm events to maintain design capacity of the system.		40 *CFR* 264.301(i) *OAC* 3745-57-03(I)
Wind dispersal control system	If the landfill contains any particulate matter which may be subject to wind dispersal, must cover or manage the landfill to control wind dispersal of particulate matter.	Operation of a RCRA hazardous waste landfill**—applicable**	40 *CFR* 264.301(j) *OAC* 3745-57-03(J)
Post-construction monitoring of liners, leak detection, run-on/run-off systems during the active life of the facility	Must inspect landfill weekly and after storm events to ensure proper functioning of the run-on and run-off control system, wind dispersal control systems, and the leachate collection and removal systems.	Operation of a RCRA hazardous waste landfill**—applicable**	40 *CFR* 264.303(b) *OAC* 3745-57-05(B)
	Must collect and remove liquids in the leak detection system sumps to minimize the head on the bottom liner.		40 *CFR* 264.301(c)(4) *OAC* 3745-57-03(C)(4)
	Must record the amount of liquids removed from the leak detection system sumps at least weekly during the active life and closure period.		40 *CFR* 264.303(c)(1)
Environmental monitoring at a LLW disposal facility	The environmental monitoring program shall be designed and operated to include measuring and evaluating releases, migration of radionuclides, disposal unit subsidence, and changes in disposal facility and disposal site parameters which may affect long term performance.	Operation of a LLW disposal facility at a DOE site**—TBC**	DOE M 435.1-1(IV)(R)(3)(b)
Facility and equipment inspection, testing and maintenance	Must inspect facility for malfunctions and deterioration, operator errors, and discharges to identify any problems and remedy any deterioration or malfunction of equipment or structures on a schedule and in a manner that ensures that the problem does not lead to an environmental or human health hazard, as detailed in 40 *CFR* 264.15 [*OAC* 3745-54-15].	Operation of a RCRA hazardous waste facility**—applicable**	40 *CFR* 264.15(a) – (d) *OAC* 3745-54-15(A) – (D)
	All facility communications or alarm systems, fire protection equipment, spill control equipment, and decontamination equipment, where required, shall be tested and maintained as necessary to assure its proper operation in time of emergency.		40 *CFR* 264.33 *OAC* 3745-54-33

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Required emergency equipment	All facilities shall be equipped with the following:		40 *CFR* 264.32 *OAC* 3745-54-32
	• An internal communications or alarm system capable of providing immediate emergency instruction to facility personnel.		40 *CFR* 264.32(A) *OAC* 3745-54-32(A)
	• A device capable of summoning emergency assistance from local police departments, fire departments, or OEPA or local emergency response teams.		40 *CFR* 264.32(B) *OAC* 3745-54-32(B)
	• Portable fire extinguishers, fire control equipment, including but not limited to, special extinguishing equipment, such as that using foam, inert gas, or dry chemicals, spill control equipment, and decontamination equipment.		40 *CFR* 264.32(C) *OAC* 3745-54-32(C)
	• Water at adequate volume and pressure to supply water hose streams, or foam producing equipment, or automatic sprinklers, or water spray systems.		40 *CFR* 264.32(D) *OAC* 3745-54-32(D)
Access to communications or alarm system	Whenever hazardous waste is being poured, mixed, spread, or otherwise handled, all personnel involved in the operation shall have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another employee, unless such a device is not required under 40 *CFR* 264.32 [*OAC* 3745-54-32].	Operation of a RCRA hazardous waste facility—**applicable**	40 *CFR* 264.34(a) *OAC* 3745-54-34(A)
	If there is only one employee on the premises while the facility is operating, such employee shall have immediate access to a device capable of summoning external emergency assistance, unless such a device is not required under 40 *CFR* 264.32 [*OAC* 3745-54-32].		40 *CFR* 264.34(b) *OAC* 3745-54-34(B)
Required aisle space	Shall maintain aisle space to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency, unless it can be satisfactorily demonstrated that aisle space is not needed for any of these purposes.	Operation of a RCRA hazardous waste facility—**applicable**	40 *CFR* 264.35 *OAC* 3745-54-35

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Purpose and implementation of a contingency plan	Substantive requirements will be met to minimize hazards to human health or the environment from fires, explosions or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water.	Operation of a RCRA hazardous waste facility—**applicable**	40 *CFR* 264.51(a) *OAC* 3745-54-51(A)
	Substantive requirements shall be implemented immediately whenever there is a fire, explosion or release of hazardous waste or hazardous waste constituents which could threaten human health or the environment.		40 *CFR* 264.51(b) *OAC* 3745-54-51(B)
Content of contingency plan	nply with the substantive requirements of §§264.51 and 264.56 [rules 3745-54-51 and 3745-54-56 of the Administrative Code] in response to fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface waster at the facility. 40 *CFR* 264.52(a) through (f) [*OAC* 3745-54-52(A) through (F)] describes what must be included in the Plan.	Operation of a RCRA hazardous waste facility—**applicable**	40 *CFR* 264.52 *OAC* 3745-54-52
Emergency coordinator	ıll times, there shall be at least one employee either on the facility premises or on call with responsibility for coordinating all internal emergency response measures. This coordinator shall be thoroughly familiar with all aspects of the facility's contingency plan, all operations and activities at the facility, the locations and characteristics of waste handled, the location of all records within the facility, and the facility layout. In addition, this person shall have the authority to commit the resources needed to implement the contingency plan.	Operation of a RCRA hazardous waste facility—**applicable**	40 *CFR* 264.55 *OAC* 3745-54-55
Emergency procedures	enever there is an imminent or actual emergency situation, the emergency coordinator, or his designee when the emergency coordinator is on call, must immediately implement the substantive requirements detailed in 40 *CFR* 264.56 [*OAC* 3745-54-56].	Operation of a RCRA hazardous waste facility—**applicable**	40 *CFR* 264.56 *OAC* 3745-54-56
Training requirements	Facility personnel must successfully complete a program of classroom instruction or on-the-job training in accordance with the program outlined in 40 *CFR* 264.16 [*OAC* 3745-54-16] and take part in an annual review of this initial training.	Operation of a RCRA hazardous waste facility**—applicable**	40 *CFR* 264.16 *OAC* 3745-54-16

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Operation of an active ACM waste disposal site	Shall cause or permit no visible emissions to the outside air; or shall comply with the requirements of *OAC* 3745-20-06(B) [as noted below].	Operation of an active waste disposal site that receives ACM—**applicable**	*OAC* 3745-20-06(A)
	Shall be no visible emissions to the outside air from ACM during the on-site transportation, transfer, deposition, or compacting operations.		*OAC* 3745-20-06(B)(1)
	Deposition and burial operations shall be conducted in a manner which prevents handling by equipment or persons that causes asbestos-containing waste materials to be broken up or dispersed before the materials are buried.		*OAC* 3745-20-06(B)(2)
	As soon as practicable after deposition of the ACM but no later than at the end of each operating day, the ACM deposited during the operating day shall be covered with at least 12 inches of compacted nonasbestos-containing material. Alternatively, may apply for approval to utilize alternative control methods to bind dust, control wind erosion or convert asbestos to nonfriable forms.		*OAC* 3745-20-06(B)(3)
	During the unloading, deposition, burial, and initial compaction of ACM, must establish a restricted area adequate to deter the unauthorized entry of the general public and any unauthorized personnel from any location within one hundred feet of the operations; and		*OAC* 3745-20-06(B)(4)
	Shall display a sign not less than 20 ×14 in. so that it is visible at all entrances and at intervals of 300 ft or less along the property line or the fencing immediately surrounding the restricted area using wording, letter sizes, and styles in accordance with specifications listed in *OAC* 3745-20-06(B)(5).		*OAC* 3745-20-06(B)(5)
Operation of a TSCA chemical waste landfill	Site shall be operated and maintained to prevent hazardous conditions resulting from spilled liquids and windblown materials.	Operation of a TSCA chemical waste landfill—**applicable**	40 *CFR* 761.75(b)(9)(iii)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Inventory requirements	Record on a map the exact location, and dimensions, including depth, of each cell in reference to permanently surveyed benchmarks and document the contents of each cell and the approximate location of each hazardous waste type within each cell.	Operation of a RCRA hazardous waste facility—**applicable**	40 *CFR* 264.309 *OAC* 3745-57-09
	Disposal records shall include information on the PCB concentration in the liquid wastes and the three dimensional burial coordinates for PCBs and PCB Items.	Operation of a TSCA chemical waste landfill—**applicable**	40 *CFR* 761.75(b)(8)(iv)
	Maintain until closure records of the location, depth and area, and quantity in cubic yards of asbestos-containing waste material within the disposal site on a map or diagram.	Operation of an active waste disposal site that receives ACM—**applicable**	40 *CFR* 61.154(f) *OAC* 3745-20-06(C)(2)
	Construction and operation of a groundwater monitoring system at a landfill		
Construction of groundwater monitoring wells	All RCRA monitoring wells must be cased in a manner that maintains the integrity of the monitoring well bore hole. This casing must be screened or perforated and packed with gravel or sand, where necessary to enable collection of groundwater samples. The annular space above the sampling depth must be sealed to prevent contamination of groundwater and samples.	Construction of RCRA groundwater monitoring well—**applicable**	40 *CFR* 264.97(c) *OAC* 3745-54-97(C)
	All TSCA monitoring wells shall be cased and the annular space between the monitor zone (zone of saturation) and the surface shall be completely backfilled with Portland cement or an equivalent material and plugged with Portland cement to effectively prevent percolation of surface water into the well bore. The well opening at the surface shall have a removable cap to provide access and to prevent entrance of rainfall or stormwater run-off.	Construction of a TSCA groundwater monitoring well—**applicable**	40 *CFR* 761.75(b)(6)(ii)(B)
Monitoring at a TSCA chemical waste landfill	The groundwater and surface water from the disposal site area must be sampled prior to commencing operation for use as baseline data.	Operation of a TSCA chemical waste landfill—**applicable**	40 *CFR* 761.75(b)(6)(i)(A)
	At a minimum, all samples shall be analyzed for PCBs, pH, specific conductance, and chlorinated organics. Sampling methods and analytical procedures for these parameters shall comply with those specified in 40 *CFR* 136 as amended in 41 FR 52779 on December 1, 1976.		40 *CFR* 761.75(b)(6)(iii)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Groundwater monitoring at a TSCA chemical waste landfill	If underlying earth materials are homogenous, impermeable, and uniformly sloping in one direction, only three sampling points shall be necessary. The points shall be equally spaced on a line through center of disposal area and extending from the area of highest water table elevation to the area of the lowest water table elevation.	Operation of TSCA chemical waste landfill groundwater monitoring program—**applicable**	40 *CFR* 761.75(b)(6)(ii)(A)
	The groundwater monitoring well shall be pumped to remove the volume of liquid initially contained in the well before obtaining a sample for analysis. The discharge shall be treated to meet applicable State or Federal standards or recycled to the chemical waste landfill.	Operation of TSCA groundwater monitoring wells—**applicable**	40 *CFR* 761.75(b)(6)(ii)(B)
Groundwater monitoring program at a RCRA landfill	Must implement a groundwater monitoring program capable of determining the facility's impact on the quality of groundwater in the uppermost aquifer underlying the facility. Must comply with the substantive requirements of Subpart F 40 *CFR* 264.90 through 264.100 [*OAC* 3745-54-90 through 3745-54-100] for the purposes of detecting, characterizing and responding to releases during the active life of the regulated unit, including the closure and post-closure periods.	Operation of a RCRA hazardous waste unit—**applicable**	40 *CFR* 264.90(a) and (c) *OAC* 3745-54-90(A) and (C)
Groundwater protection standard	Must ensure that hazardous constituents detected in the groundwater from a regulated unit do not exceed the concentration limits for MCLs in the uppermost aquifer underlying the waste management area beyond the point of compliance during the compliance period. Must comply with the substantive requirements for detection, compliance and correction action monitoring, as appropriate.	Operation of a RCRA groundwater monitoring program**—applicable**	40 *CFR* 264.92 through 264.100 *OAC* 3745-54-92 through 54-100
General groundwater monitoring requirements for a RCRA landfill	The groundwater monitoring system must consist of a sufficient number of wells, installed at appropriate locations and depths to yield samples from the uppermost aquifer that: • Represent the quality of background groundwater. • Represent the quality of groundwater passing the point of compliance.	Operation of a RCRA detection monitoring program under 40 *CFR* 264.98**—applicable**	40 *CFR* 264.97(a) *OAC* 3745-54-97(A)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
General groundwater monitoring requirements for a RCRA landfill (continued)	• Allows for the detection of contamination when the hazardous waste or constituents have migrated from the waste management area to the uppermost aquifer.		
Groundwater monitoring program for a RCRA landfill	Groundwater monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide a reliable indication of groundwater quality below the waste management area.	Operation of a RCRA detection monitoring program under 40 *CFR* 264.98**—applicable**	40 *CFR* 264.97(d) *OAC* 3745-54-97(D)
	Groundwater monitoring program must include sampling and analytical methods that are appropriate and accurately measure hazardous constituents in groundwater samples.		40 *CFR* 264.97(e) *OAC* 3745-54-97(E)
	Groundwater monitoring program must include a determination of the groundwater surface elevation each time groundwater is sampled.		40 *CFR* 264.97(f) *OAC* 3745-54-97(F)
Groundwater sample collection	The number and size of samples collected to establish background and measure groundwater quality at the point-of-compliance shall be appropriate for the form of statistical test employed following generally accepted statistical principles.	Operation of a RCRA detection monitoring program under 40 *CFR* 264.98**—applicable**	40 *CFR* 264.97(g) *OAC* 3745-54-97(G)
	Shall specify the statistical method, in conformance with 40 *CFR* 264.97(h), to be used in evaluating groundwater monitoring data for each hazardous constituent. Statistical method used must be protective of human health and the environment and must comply with performance standards outlined in 40 *CFR* 264.97(i) [*OAC* 3745-54-97(I)].		40 *CFR* 264.97(h) *OAC* 3745-54-97(H) 40 *CFR* 264.97(i) *OAC* 3745-54-97(I)
	Groundwater monitoring data collected in accordance with 40 *CFR* 264.97(g) [*OAC* 3745-54-97(G)], including actual levels of constituents, must be maintained in the facility operating records.		40 *CFR* 264.97(j) *OAC* 3745-54-97(J)
Detection monitoring for a RCRA landfill	Must monitor for EPA-specified indicator parameters, waste constituents or reaction products that provide a reliable indication of the presence of hazardous constituents in groundwater.	Operation of a RCRA detection monitoring program under 40 *CFR* 264.98**—applicable**	40 *CFR* 264.98(a) *OAC* 3745-54-98(A)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Detection monitoring for a RCRA landfill (continued)	Must install a groundwater monitoring system at the compliance point as specified under 40 *CFR* 264.95 that complies with 264.97(a)(2), (b), and (c).		40 *CFR* 264.98(b) *OAC* 3745-54-98(B)
	Must conduct a monitoring program for each EPA-specified chemical parameter and hazardous constituent in accordance with 40 *CFR* 264.97(g).		40 *CFR* 264.98(c) *OAC* 3745-54-98(C)
	Sampling frequency shall be sufficient to determine whether there is statistically significant evidence of contamination.		40 *CFR* 264.98(d) *OAC* 3745-54-98(D)
	Must determine the groundwater flow rate and direction in the uppermost aquifer at least annually.		40 *CFR* 264.98(e) *OAC* 3745-54-98(E)
	Must determine whether there is statistically significant evidence of contamination of any EPA-specified chemical parameter or hazardous constituent at a specified frequency.		40 *CFR* 264.98(f) *OAC* 3745-54-98(F)
	If there is statistically significant evidence of contamination at any monitoring well at the compliance point, must follow the substantive provisions of this subsection.		40 *CFR* 264.98(g) *OAC* 3745-54-98(G)
	Closure of a landfill		
Closure performance standard for RCRA hazardous waste management units	Must close the facility in a manner that: • Minimizes the need for further maintenance; and	Closure of a RCRA hazardous waste management unit—**applicable**	40 *CFR* 264.111(a) *OAC* 3745-55-11(A)
	• Controls, minimizes, or eliminates, to the extent necessary to protect human health and environment, post-closure escape of hazardous waste, hazardous constituents, contaminated run-off, or hazardous waste decomposition products to ground or surface waters or to the atmosphere.		40 *CFR* 264.111(b) *OAC* 3745-55-11(B)
	• Complies with the substantive closure requirements of 40 *CFR* 264 [*OAC* 3745-54 to 3745-57 and 3745-205] for particular type of facility including, but not limited to, requirements of Sects. 264.178 (container storage area) [*OAC* 3745-55-78], 264.197 (tanks) [*OAC* 3745-55-97], 264.310 (landfills) [*OAC* 3745-57-10], and 264.554 (remediation waste piles) [*OAC* 3745-56-58].		40 *CFR* 264.111(c) *OAC* 3745-55-11(C)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Closure performance standard for RCRA hazardous waste management units (continued)	Must have a closure plan identifying the steps necessary to perform partial and/or final closure of the facility at any point during its active life and must amend the plan as necessary.		40 *CFR* 264.112 *OAC* 3745-55-12
	During the partial and final closure periods, all contaminated equipment, structures, and soils must be properly disposed or decontaminated.		40 *CFR* 264.114 *OAC* 3745-55-14
Closure of RCRA landfill	Must cover the landfill or cell with a final cover designed and constructed to:	Closure of a RCRA hazardous waste landfill—**applicable**	40 *CFR* 264.310 *OAC* 3745-57-10
	• Provide long-term minimization of migration of liquids through the closed landfill.		40 *CFR* 264.310(a)(1) *OAC* 3745-57-10(A)(1)
	• Function with minimum maintenance.		40 *CFR* 264.310(a)(2) *OAC* 3745-57-10(A)(2)
	• Promote drainage and minimize erosion or abrasion of the cover.		40 *CFR* 264.310(a)(3) *OAC* 3745-57-10(A)(3)
	• Accommodate settling and subsidence so that integrity of the cover is maintained.		40 *CFR* 264.310(a)(4) *OAC* 3745-57-10(A)(4)
	• Have a permeability less than or equal to the permeability any bottom liner system or natural subsoils present.		40 *CFR* 264.310(a)(5) *OAC* 3745-57-10(A)(5)
Control and stabilization of uranium-bearing wastes at a DOE site	Control and stabilization features shall be designed to: • Provide to the extent reasonably achievable an effective life of 1000 years with a minimum of at least 200 years.	Long-term management of uranium and its decay products—**TBC**	DOE Order 458.1(4)(h)(1)(d)(1)(a)
	• Limit Rn-222 emanation to the atmosphere from the wastes to less than an annual average release rate of 20 pCi/m^2/s and prevent increase in the annual average Rn-222 concentration at or above any location outside the boundary of the contaminated area by more than 0.5 pCi/L.		DOE Order 458.1(4)(h)(1)(d)(1)(b)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Closure of an asbestos-containing waste disposal site	Upon closure, meet the following requirements:	Closure of an active asbestos-containing waste disposal site—**applicable**	40 *CFR* 61.154(g) – (h) *OAC* 3745-20-06(E)
	• Either discharge no visible emissions to the outside air, or		40 *CFR* 61.151(a)(1) *OAC* 3745-20-07(A)(1)
	• Cover the waste material with at least 15 cm (6 in) of compacted nonasbestos-containing material and grow and maintain a vegetative cover on the area adequate to prevent exposure of asbestos-containing material, or		40 *CFR* 61.151(a)(2) *OAC* 3745-20-07(A)(2)
	• Cover the waste material with at least 60 cm (2 ft) of compacted nonasbestos-containing material, and maintain it to prevent exposure of the asbestos-containing waste.		40 *CFR* 61.151(a)(3) *OAC* 3745-20-07(A)(3)
	• Unless a natural barrier adequately deters access by the general public, install and maintain warning signs and fencing as detailed in 40 *CFR* 61.151(b)(1) – (3).		40 *CFR* 61.151(b) *OAC* 3745-20-07(B)
	• Owner may use an alternative method of controlling the asbestos that has received prior approval of the Administrator rather than comply with the requirements of 40 *CFR* 61.151(a) or (b).		40 *CFR* 61.151(c) *OAC* 3745-20-07(C).
	NOTE: Approval would be granted through the DFF&O document approval process and included in the appropriate DFF&O document.		
	Post-closure care of a landfill		
Duration of postclosure care	Post-closure care must begin after closure and continue for at least 30 years after that date. The Director may shorten or extend the postclosure period.	Closure of a RCRA hazardous waste disposal unit—**applicable**	40 *CFR* 264.117(a) *OAC* 3745-55-17(A)
Continuation of security requirements	Continuation of the security requirements of 40 *CFR* 264.14 may be required during part or all of the postclosure period when hazardous wastes may remain exposed after completion of partial or final closure or access by the public or domestic livestock may pose a hazard to human health.		40 *CFR* 264.117(b) *OAC* 3745-55-17(B)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Protection of disposal facility	Post-closure use of property must never be allowed to disturb the integrity of the final cover, liners, or any other components of the containment system or the facility's monitoring system unless the disturbance is necessary to the proposed use of the property and will not increase the potential hazard to human health or the environment or it is necessary to reduce a threat to human health or the environment.	Closure of a RCRA hazardous waste disposal unit—**applicable**	40 *CFR* 264.117(c) *OAC* 3745-55-17(C)
Postclosure plan	Must have a postclosure plan identifying the activities that will be carried on after closure of each disposal unit and the frequency of these activities, and must amend the plan as necessary. All postclosure care activities must be in accordance with the approved postclosure care plan.		40 *CFR* 264.117(d) *OAC* 3745-55-17(D) 40 *CFR* 264.118 *OAC* 3745-55-18
General post-closure care of a RCRA hazardous waste landfill	After final closure, owner or operator must:	Closure of a RCRA hazardous waste landfill—**applicable**	40 *CFR* 264.310(b) *OAC* 3745-57-10(B)
	• Maintain the effectiveness and integrity of the final cover including making repairs to the cap as necessary to correct effects of settling, erosion, subsidence or other events.		40 *CFR* 264.310(b)(1) *OAC* 3745-57-10(B)(1)
	• Continue to operate the leachate collection and removal system until leachate is no longer detected.		40 *CFR* 264.310(b)(2) *OAC* 3745-57-10(B)(2)
	• Maintain and monitor the leachate detection system in accordance with the substantive requirements in 40 *CFR* 264.301(a)(3)(iv) and (4) and 40 *CFR* 264.303(c).		40 *CFR* 264.310(b)(3) *OAC* 3745-57-10(B)(3)
	• Maintain and monitor a ground water monitoring system and comply with all other applicable provisions 40 *CFR* 264, Subpart F.		40 *CFR* 264.310(b)(4) *OAC* 3745-57-10(B)(4)
	• Prevent run-on and run-off from eroding or otherwise damaging final cover.		40 *CFR* 264.310(b)(5) *OAC* 3745-57-10(B)(5)
	• Protect and maintain surveyed benchmarks used to locate waste cells.		40 *CFR* 264.310(b)(6) *OAC* 3745-57-10(B)(6)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Post-closure restrictions	No person shall fill in, grade, excavate, build, drill, or mine on land where a hazardous or solid waste facility was operated without authorization from OEPA.	Closure of a hazardous or solid waste disposal facility—**applicable**	*OAC* 3745-27-13(A)
Monitoring of the leachate collection system post-closure	Must record the amount of liquids removed from the leak detection system at least monthly after the final cover is installed and thereafter as specified in 40 *CFR* 264.303(c)(2) [*OAC* 3745-57-05(C)(2)].	Closure of a RCRA landfill—**applicable**	40 *CFR* 264.303(c)(2) *OAC* 3745-57-05(C)(2)
Management of wastes in a CAMU			
Management of CAMU-eligible wastes within a CAMU	A CAMU may used for the management of CAMU-eligible waste in accordance with the following requirements of 40 *CFR* 264.552:	Management of CAMU-eligible wastes within a CAMU located within the contiguous property under the control of the owner or operator where the wastes to be managed in the CAMU originated—**applicable**	
	• CAMU shall facilitate implementation of reliable, effective, protective and cost-effective remedies;		40 *CFR* 264.552(c)(1) *OAC* 3745-57-72(C)(1)
	• Waste management activities shall not create unacceptable risks or to the environment resulting from exposure to hazardous wastes or hazardous constituents;		40 *CFR* 264.552(c)(2) *OAC* 3745-57-72(C)(2)
	• CAMU shall include uncontaminated areas of the facility, only if including such areas for the purpose of managing CAMU-eligible waste is more protective than management of such wastes at contaminated areas of the facility;		40 *CFR* 264.552(c)(3) *OAC* 3745-57-72(C)(3)
	• Areas within the CAMU, where wastes remain in place after closure of the CAMU, shall be managed and contained so as to minimize future releases, to the extent practicable;		40 *CFR* 264.552(c)(4) *OAC* 3745-57-72(C)(4)
	• CAMU shall expedite the timing of remedial activity implementation, when appropriate and practicable;		40 *CFR* 264.552(c)(5) *OAC* 3745-57-72(C)(5)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Management of CAMU-eligible wastes within a CAMU (continued)	• CAMU shall enable the use, when appropriate, of treatment technologies (including innovative technologies) to enhance the long-term effectiveness of remedial actions by reducing the toxicity, mobility, or volume of wastes that will remain in place after closure of the CAMU; and		40 *CFR* 264.552(c)(6) *OAC* 3745-57-72(C)(6)
	• CAMU shall, to the extent practicable, minimize the land area of the facility upon which wastes will remain in place after closure of the CAMU.		40 *CFR* 264.552(c)(7) *OAC* 3745-57-72(C)(7)
Design, operation, and closure of a CAMU	Shall comply with the substantive minimum design, operation, treatment, and closure standards for a CAMU, including the following:	Management of CAMU-eligible wastes within a CAMU located within the contiguous property under the control of the owner or operator where the wastes to be managed in the CAMU originated— **applicable**	40 *CFR* 264.552(e)(3) *OAC* 3745-57-72(E)(3)
	• Liners and leachate collection		40 *CFR* 264.552(e)(3)(i) *OAC* 3745-57-72(E)(3)(a)
	• Treatment of principal hazardous constituents		40 *CFR* 264.552(e)(4) *OAC* 3745-57-72(E)(4)
	• Ground water monitoring		40 *CFR* 264.552(e)(5) *OAC* 3745-57-72(E)(5)
	• Capping requirements		40 *CFR* 264.552(e)(6)(iv) *OAC* 3745-57-72(E)(6)(d)
	• Closure and postclosure care		40 *CFR* 264.552(e)(6) *OAC* 3745-57-72(E)(6)
	CAMUs into which wastes are placed where all wastes have constituent levels at or below remedial levels or goals applicable to the site do not have to comply with the liner requirements at 40 *CFR* 264.552(e)(3)(i), the capping requirements at 40 *CFR* 264.552 (e)(6)(iv), or the ground water monitoring requirements at 40 *CFR* 264.552 (e)(5).		40 *CFR* 264.552(g) *OAC* 3745-57-72(G)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
	Water treatment and discharge (e.g., leachate, stormwater, decon water)		
Release of wastewater from a new hazardous waste landfill through a new point source	Except as provided in 40 *CFR* 445.1, discharges of wastewater from a new RCRA hazardous waste landfill must comply with the performance standards for new sources, which are the same as the maximum daily and maximum monthly average effluent limitations listed in 40 *CFR* 445.11.	Release of water from a new hazardous waste landfill through a new discharge point source—**applicable**	40 *CFR* 445.14
Disposal of wastewaters containing RCRA hazardous constituents in a CWA wastewater treatment unit	Disposal is not prohibited if the wastes are managed in a treatment system which subsequently discharges to waters of the U.S. under the CWA unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* 268.40 (*OAC* 3745-270-40) or are D003 reactive cyanide.	Disposal of RCRA restricted hazardous wastes that are hazardous only because they exhibit a hazardous characteristic and are not otherwise prohibited under 40 *CFR* Part 268—**applicable**	40 *CFR* 268.1(c)(4)(i) *OAC* 3745-270-01(C)(4)
General duty to mitigate for discharge of wastewater from water treatment system	Take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of effluent standards which has a reasonable likelihood of adversely affecting human health or the environment.	Discharge of pollutants to surface waters—**applicable**	40 *CFR* 122.41(d) *RC* 6111.04(C)
Operation and maintenance of treatment system	Properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) installed or used to achieve compliance with the effluent standards. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures.	Discharge of pollutants to surface waters—**applicable**	40 *CFR* 122.41(e) *OAC* 3745-33-08(A)(8)
Criteria for discharge of wastewater with radionuclides into surface water	Except for tritium and sanitary sewers, apply best available technology (BAT) if at the point of discharge: • The annual average concentration of a given radionuclide is greater than the Derived Concentration Technical Standard (DCS) value for water or, for multiple radionuclides, the composite DCS must be the sum of the fractional DCS values derived from DOE-approved DCS values.	Discharge or release of liquids containing radionuclides from DOE activities—**TBC**	DOE Order 458.1(g)(5)(a)
	• The discharge contributes greater than 10 mrem (0.1 mSv) annual TED to members of the public, or		DOE Order 458.1(g)(5)(b)

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Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Criteria for discharge of wastewater with radionuclides into surface water (continued)	• The collective dose from all DOE sources is greater than 100 person-rem (1 person-Sv) and the liquid discharge contributes 50 percent or more of this collective dose.		DOE Order 458.1(g)(5)(c)
	Conduct activities to ensure that liquid discharges containing radionuclides from DOE activities do not exceed an average (at the point of discharge) of either of the following: • 5 pCi (0.2 Bq) per gram above background level of settleable solids for alpha-emitting radionuclides or • 50 pCi (2 Bq) per gram above background level of settleable solids for beta-emitting radionuclides.	Release of liquids containing radionuclides from DOE activities—**TBC**	DOE Order 458.1(g)(4)
	Ensure that liquid releases are managed in a manner that protects ground water resources now and in the future, based on use and value considerations.		DOE Order 458.1(g)(3)
	Ensure that radionuclides contained in liquid effluents do not cause private or public drinking water systems to exceed the drinking water MCLs in 40 *CFR* 141.		DOE Order 458.1(g)(7)
Technology-based treatment requirements for wastewater discharge	To the extent that EPA promulgated effluent limitations are inapplicable, shall develop on a case-by-case Best Professional Judgment (BPJ) basis under §402(a)(1)(B) of the CWA, technology based effluent limitations by applying the factors listed in 40 *CFR* §125.3(d) and shall consider: • The appropriate technology for this category or class of point sources, based upon all available information; and • Any unique factors relating to the discharger.	Discharge of pollutants to surface waters from other than a POTW—**applicable**	40 *CFR* 125.3(c)(2) *RC* 6111.042

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Water quality-based effluent limits for wastewater discharge	Must develop water quality based effluent limits that ensure that: • The level of water quality to be achieved by limits on point source(s) established under this paragraph is derived from, and complies with all applicable water quality standards; and • Effluent limits developed to protect narrative or numeric water quality criteria are consistent with the assumptions and any available waste load allocation for the discharge prepared by the State and approved by EPA pursuant to 40 *CFR* §130.7.	Discharge of pollutants to surface waters that causes, or has reasonable potential to cause, or contributes to an instream excursion above a narrative or numeric criteria within a State water quality standard established under §303 of the CWA—**applicable**	40 *CFR* 122.44(d)(1)(vii) *OAC* 3745-33-05(A)(1)
	Must attain or maintain a specified water quality through water quality related effluent limits established under §302 of the CWA.		40 *CFR* 122.44(d)(2)
	No entity shall cause pollution or place or cause to be placed any sewage, sludge, sludge materials, industrial waste, or other wastes in a location where they cause pollution of any waters of the state.		*RC* 6111.04
	No person shall violate or fail to perform any duty imposed by sections 6111.01 to 6111.08 of the Revised Code or violate any order, rule, or term or condition of a permit issued or adopted by the director of environmental protection pursuant to those sections.		*RC* 6111.07
	Stream use designations are given for Little Beaver Creek drainage basin and Scioto River drainage basin and *OAC* 3745-1-07 is referenced for applicable water quality standards.		*OAC* 3745-1-09 *OAC* 3745-1-15
	OAC 3745-1-07 provides allowable instream concentrations of pollutants that may be found in surface waters or discharged into surface waters, depending on use designation, and are applied as “outside mixing zone” or “inside mixing zone maximum” averages.		*OAC* 3745-1-07

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Water quality-based effluent limits for wastewater discharge (continued)	The general water quality criteria listed in *OAC* 3745-1-04 (which address suspended solids, floating debris, oil, scum, color, odor, toxic substances, nuisance growth of algae and weeds, and sewage) apply to all surface waters of the state including mixing zones.		*OAC* 3745-1-04
Monitoring requirements for water treatment system discharges	In addition to 40 *CFR* §122.48(a) and (b) and to assure compliance with effluent limitations, one must monitor, as provided in subsections (i) thru (iv) of §122.44(i)(1).	Discharge of pollutants to surface waters—**applicable**	40 *CFR* 122.44(i)(1) *OAC* 3745-33-08(A)(6)
	NOTE: Monitoring parameters, including frequency of sampling, will be developed as part of the DFF&O process and included in a Remedial Design, RAWP, or other appropriate DFF&O document.		
	All effluent limitations, standards and prohibitions shall be established for each outfall or discharge point, except as provided under §122.44(k).		40 *CFR* 122.45(a) *OAC* 3745-33-06(A)
	All effluent limitations, standards and prohibitions, including those necessary to achieve water quality standards, shall unless impracticable be stated as maximum daily and average monthly discharge limitations for all discharges.	Continuous discharge of pollutants to surface waters—**applicable**	40 *CFR* 122.45(d)(1)
Air emissions from process vents in treatment of VOC contaminated water	Except as provided in paragraphs (C), (D) and (H) of *OAC* 3745-15-05 and division (B) of section 3704.011 of the Revised Code, any air contaminant source is exempt from Chapter 3704 of the Revised Code and rules adopted thereunder, unless the potential emissions of any one of the following exceeds ten pounds per day: particulate matter, sulfur dioxide, nitrogen oxides, organic compounds, carbon monoxide, lead or any other air contaminant.	Air emissions from an air contaminant source**—applicable**	*OAC* 3745-15-05(B)
Waste generation, characterization, and segregation			
Characterization of solid waste (*all primary and secondary wastes*)	Must determine if solid waste is hazardous or is excluded under 40 *CFR* 261.4 [*OAC* 3745-51-04]; and	Generation of solid waste as defined in 40 *CFR* 261.2—**applicable**	40 *CFR* 262.11(a) *OAC* 3745-52-11(A)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Characterization of solid waste (*all primary and secondary wastes*) (continued)	Must determine if waste is listed as a hazardous waste in 40 *CFR* 261 [*OAC* 3745-51-30 to 3745-51-35]; or	Generation of solid waste, which is not excluded under 40 *CFR* 261.4—**applicable**	40 *CFR* 262.11(b) *OAC* 3745-52-11(B)
	Must determine whether the waste is identified in Subpart C of 40 *CFR* 261 [*OAC* 3745-51-20 through 3745-51-24], characterizing the waste by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used.	Generation of solid waste that is not listed in Subpart D of 40 *CFR* 261 and not excluded under 40 *CFR* 261.4—**applicable**	40 *CFR* 262.11(c) *OAC* 3745-52-11(C)
	Must refer to 40 *CFR* 261, 262, 264, 265, 266, 268, and 273 [*OAC* 3745-51, 3745-54 to 3745-57, 3745-65 to 3745-69, 3745-205, 3745-256, 3745-266, 3745-270, and 3745-273] for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste that is determined to be hazardous—**applicable**	40 *CFR* 262.11(d) *OAC* 3745-52-11(D)
Characterization of hazardous waste	Must obtain a detailed chemical and physical analysis of a representative sample of the waste(s) that, at a minimum, contains all the information which must be known to treat, store, or dispose of the waste in accordance with 40 *CFR* 264 and 268 [*OAC* 3745-54 to3745-57, 3745-205, and 3745-270].	Generation of RCRA hazardous waste for storage, treatment, or disposal—**applicable**	40 *CFR* 264.13(a)(1) and (2) *OAC* 3745-54-13(A)(1) and (2)
Determinations for land disposal of hazardous waste	Must determine if the waste meets the treatment standards in 40 *CFR* 268.40, 268.45, or 268.49 [*OAC* 3745-270-40, 3745-270-45, and 3745-270-49] by testing in accordance with prescribed methods or use of generator knowledge of waste.	Generation of RCRA hazardous waste for storage, treatment, or disposal—**applicable**	40 *CFR* 268.7(a) *OAC* 3745-270-07(A)
	Treatment facilities must test their wastes according to the frequency specified in their waste analysis plans to determine if the waste meets the treatment standards in 40 *CFR* 268.40, 268.45, or 268.49 [*OAC* 3745-270-40, 3745-270-45, and 3745-270-49] prior to disposal.	Treatment of RCRA hazardous waste prior to disposal—**applicable**	40 *CFR* 268.7(b) *OAC* 3745-270-07(B)
	Must determine each EPA Hazardous Waste Number (waste code) to determine the applicable treatment standards under 40 *CFR* 268.40 et seq. [*OAC* 3745-270-40 et seq.].	Generation of RCRA hazardous waste for storage, treatment, or disposal—**applicable**	40 *CFR* 268.9(a) *OAC* 3745-270-09(A)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Determinations for land disposal of hazardous waste (continued)	Must determine the underlying hazardous constituents [as defined in 40 *CFR* 268.2(i) and *OAC* 3745-270-02] in the waste.	Generation of RCRA characteristically hazardous waste (and is not D001 nonwastewaters treated by CMBST, RORGS, or POLYM of Sect. 268.42, Table 1) for storage, treatment, or disposal—**applicable**	40 *CFR* 268.9(a) *OAC* 3745-270-09(A)
	Must determine whether the waste meets other applicable treatment standards under 40 *CFR* 268.9 [*OAC* 3745-270-09] for characteristic wastes.	Generation of RCRA characteristically hazardous waste—**applicable**	40 *CFR* 268.9(b) to (d) *OAC* 3745-270-09(B) to (C)
Characterization and management of wastewater (e.g., decon water)	On-site wastewater treatment units (including tank systems, conveyance systems, and ancillary equipment used to treat, store or convey wastewater to the wastewater treatment facility) are exempt from the requirements of RCRA Subtitle C standards.	On-site wastewater treatment units subject to regulation under Sect. 402 or Sect. 307(b) of the CWA—**applicable**	40 *CFR* 264.1(g)(6) *OAC* 3745-54-01(G)(6)
Characterization and management of industrial wastewater	Industrial wastewater discharges that are point source discharges subject to regulation under Sect. 402 of the CWA, as amended, are not solid wastes for the purpose of hazardous waste management.	Generation of industrial wastewater for discharge—**applicable**	40 *CFR* 261.4(a)(2) *OAC* 3745-51-04(A)(2)
Characterization of LLW	Shall be characterized using direct or indirect methods and the characterization documented in sufficient detail to ensure safe management and compliance with the WAC of the receiving facility.	Generation of LLW for storage or disposal at a DOE facility—**TBC**	DOE M 435.1-1(IV)(I)
	Characterization data shall, at a minimum, include the following information relevant to the management of the waste:		DOE M 435.1-1(IV)(I)(2)
	• Physical and chemical characteristics		DOE M 435.1-1(IV)(2)(a)
	• Volume, including the waste and any stabilization or absorbent media		DOE M 435.1-1(IV)(I)(2)(b)
	• Weight of the container and contents		DOE M 435.1-1(IV)(I)(2)(c)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Characterization of LLW (continued)	• Identities, activities, and concentrations of major radionuclides		DOE M 435.1-1(IV)(I)(2)(d)
	• Characterization date		DOE M 435.1-1(IV)(I)(2)(e)
	• Generating source		DOE M 435.1-1(IV)(I)(2)(f)
	• Any other information which may be needed to prepare and maintain the disposal facility performance assessment, or demonstrate compliance with performance objectives		DOE M 435.1-1(IV)(I)(2)(g)
Segregation of scrap metal for recycle	Material is not subject to RCRA requirements for generators, transporters, and storage facilities under 40 *CFR* Parts 262 through 266, 268, 270, or 124 [*OAC* 3745-50-40 to 3745-50-235 or 3745-52, -53, -54 to -57, -65 to -69, -205, -256, -266, and -270].	Scrap metal, as defined in 40 *CFR* 261.1(c)(6) intended for recycle—**applicable**	40 *CFR* 261.6(a)(3)(ii) *OAC* 3745-51-06(A)(3)(b)
Management of recyclable materials for precious metal recovery	Recyclable materials being collected, transported or stored that are being reclaimed to recover economically significant amounts of gold, silver, platinum, palladium, iridium, osmium, rhodium, ruthenium, or any combination of these must be managed in accordance with the substantive requirements of *OAC* 3745-266-70.	Management of recyclable materials for precious metal recovery—**applicable**	*OAC* 3745-266-70
Management of spent lead acid batteries being reclaimed	Spent lead acid batteries being collected, transported and stored prior to regeneration must be managed in accordance with particular hazardous waste requirements depending on permit status and whether they are being reclaimed through regeneration or in other ways. Management options are detailed in 40 *CFR* 266.80 [*OAC* 3745-266-80]. Spent lead acid batteries can also be managed as universal wastes under 40 *CFR* 273 [*OAC* 3745-273].	Management of spent lead acid batteries being reclaimed—**applicable**	40 *CFR* 266.80 *OAC* 3745-266-80
Decontamination of radioactively contaminated equipment and building structures	Property potentially containing residual radioactive material must not be released or cleared from DOE control unless it is either demonstrated not to contain residual radioactive material based on process and historical knowledge, radiological monitoring or surveys, or a combination of these; or the property is evaluated and appropriately monitored or surveyed in accordance with DOE Order 458.1(4)(k)(3)(b).	Residual radioactive material on equipment and building structures for unrestricted use—**TBC**	DOE Order 458.1(4)(k)(3)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Release of radiological materials or scrap metal for recycle or reuse	Before being released, property shall be monitored or surveyed to determine the types and quantities of residual radioactive material within the property; the quantities of removable and total residual radioactive material on property surfaces (including residual radioactive material on or under any coating); and that contamination within or on the property is in compliance with applicable DOE Authorized Limits of DOE Order 458.1(4)(k)(6).	Radionuclide-contaminated materials and equipment intended for recycle or reuse —**TBC**	DOE Order 458.1(4)(k)(3)(b)(1)–(2) and (4)
	Where potentially contaminated surfaces are difficult to access for measurement (as in some pipes, drains, and ductwork), such property may be released after case-by-case evaluation and documentation based on both the history of its use and available measurements sufficient to demonstrate that the unsurveyable surfaces are likely to meet DOE Authorized Limits.		DOE Order 458.1(4)(k)(3)(b)(3)
Release of beryllium-contaminated equipment or other items	Must clean beryllium-contaminated equipment or other items to the lowest contamination level practicable, not to exceed the levels established in 10 *CFR* 850.31(b) and (c) and label them before release.	Release of beryllium-contaminated equipment or other items to general public or another DOE facility—**applicable**	10 *CFR* 850.31(a)
	Before being released to the general public or another DOE facility, ensure that the removable contamination level of equipment and item surfaces does not exceed the higher of 0.2 μg/100 cm^2 or the concentration level of beryllium in soil at the point or release, whichever is greater;		10 *CFR* 850.31(b)(1)
	Ensure equipment or item is labeled in accordance with 10 *CFR* 850.38(b); and		10 *CFR* 850.31(b)(2)
	Release is conditioned on the recipient's commitment to implement controls that will prevent foreseeable beryllium exposure.		10 *CFR* 850.31(b)(3)
	Before being released to another facility performing work with beryllium, must ensure that removal contamination level of equipment and other item surfaces does not exceed 3 μg/100 cm^2;	Release of beryllium-contaminated equipment or other items to another facility performing work with beryllium—**applicable**	10 *CFR* 850.31(c)(1)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Release of beryllium-contaminated equipment or other items (continued)	Ensure equipment or item is labeled in accordance with 10 *CFR* 850.38(b); and		10 *CFR* 850.31(c)(2)
	Enclose or place in sealed, impermeable bags or containers to prevent the release of beryllium dust during handling or transportation.		10 *CFR* 850.31(c)(3)
Torch-cutting of metal coated with paint that may contain PCBs	No person may open burn PCBs. Combustion of PCBs by incineration as approved under Sect. 761.60 (a) or (e), or otherwise allowed under 40 *CFR* 761, is not open burning.	Management of PCB waste for storage or disposal—**applicable**	40 *CFR* 761.50(a)(1)
Management of ACM prior to disposal	Discharge no visible emissions to the outside air, or use one of the emission control and waste treatment methods specified in Paragraphs (a)(1) through (a)(4) of 40 *CFR* 61.150 [Paragraphs (B)(1) through (B)(4) of *OAC* 3745-20-05].	Generation, collection, processing, packaging, and transporting of any asbestos-containing waste material that is not Category I or II nonfriable ACM waste that did not become crumbled, pulverized, or reduced to powder [40 *CFR* 61.150(a)(5)]—**applicable**	40 *CFR* 61.150(a) *OAC* 3745-20-05(B)
	All asbestos-containing waste material shall be deposited as soon as practicable at a waste disposal site operated in accordance with the provisions of 40 *CFR* 61.154 [*OAC* 3745-20-06], or an appropriate site that converts RACM and asbestos-containing waste materials into nonasbestos (asbestos-free) materials according to the provisions of 40 *CFR* 61.155 [*OAC* 3745-20-13].		40 *CFR* 61.150(b)(1) - (2) *OAC* 3745-20-05(A)
	The requirements of 40 *CFR* 61.150(b)(1) and (2) do not apply to Category I nonfriable ACM that is not RACM.		40 *CFR* 61.150(b)(3)
Characterization and management of universal waste	A large quantity handler of universal waste is prohibited from disposing, diluting, or treating universal waste except in accordance with 40 *CFR* 273 [*OAC* 3745-273-33 or 3745-273-37].	Generation of universal waste [as defined in 40 *CFR* 273 and *OAC* 3745-273] for disposal—**applicable**	40 *CFR* 273.31 *OAC* 3745-273-31
	Must manage universal waste in accordance with 40 *CFR* 273 [*OAC* 3745-273-33] in a way that prevents releases of any universal waste or component of a universal waste to the environment.		40 *CFR* 273.33 *OAC* 3745-273-33(A)
	Must label or mark the universal waste to identify the type of universal waste.		40 *CFR* 273.34 *OAC* 3745-273-34

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Characterization and management of universal waste (continued)	May accumulate waste for no longer than one year from the date the waste is generated or received from another handler unless the requirements of 40 *CFR* 273.35(b) [*OAC* 3745-273-35(B)] are met.		40 *CFR* 273.35(a) *OAC* 3745-273-35(A)
	May accumulate universal waste for longer than one year from the date the waste is generated or received from another handler if such activity is solely for the purpose of accumulation of such quantities of universal waste as necessary to facilitate proper recovery, treatment, or disposal. However, the handler bears the burden of proving that such activity was solely for this purpose.		40 *CFR* 273.35(b) *OAC* 3745-273-35(B)
	Shall ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures relative to their responsibilities during normal facility operations and emergencies.		40 *CFR* 273.36 *OAC* 3745-273-36
	Must immediately contain all releases of universal wastes and other residues from universal wastes, and must determine whether any material resulting from the release is hazardous waste, and if so, must manage the hazardous waste in compliance with all applicable requirements.		40 *CFR* 273.37 *OAC* 3745-273-37
	Must keep a record of each shipment of universal waste received and sent from the facility and retain record for at least 3 years. Record must include waste handler, shipper, or destination facility name and address, quantity and type of waste, and date shipment left or was received at facility.		40 *CFR* 273.39 *OAC* 3745-273.39
Management of universal waste batteries	A large quantity handler of universal waste must contain any universal waste battery that shows evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions in a container.	Generation of universal waste batteries [as defined in 40 *CFR* 273.9 and *OAC* 3745-273-02]—**applicable**	40 *CFR* 273.33(a)(1) *OAC* 3745-273-33(A)(1)
	Container must be closed, structurally sound, compatible with the contents of the battery, and lack evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions.		

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Management of universal waste batteries (continued)	Batteries, or container or tank in which the batteries are contained, must be labeled or marked clearly with any one of the following phrases: "Universal Waste – Battery(ies)" or "Waste Batter(ies)" or "Used Battery(ies)."		40 *CFR* 273.34(a) *OAC* 3745-273-34(A)
Management of universal waste pesticides	A large quantity handler of universal waste pesticide must contain the pesticide in a container that remains closed, structurally sound, compatible with the pesticide, and that lacks evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions. A leaking pesticide container must be put into an overpack container, tank, or transport container, as detailed in 40 *CFR* 273.33(b) [*OAC* 3745-273-33(B)].	Generation of universal waste pesticides [as defined in 40 *CFR* 273.9 and *OAC* 3745-273-03]—**applicable**	40 *CFR* 273.33(b) *OAC* 3745-273-33(B)(1) – (4)
	A container, tank, transport vehicle or vessel in which recalled or unused pesticides are contained must be labeled or marked clearly with the label that was on or accompanied the producted and the word "Universal Waste – Pesticide(s)" or "Waste – Pesticide(s)."		40 *CFR* 273.34(b) and (c) *OAC* 3745-273-34(B) and (C)
Management of universal waste thermostats or other mercury-containing equipment	A large quantity handler of universal waste must contain any mercury-containing equipment that shows evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions in a container.	Generation of universal waste mercury-containing equipment [as defined in 40 *CFR* 273.9 and *OAC* 3745-273-04]—**applicable**	40 *CFR* 273.33(c)(1) *OAC* 3745-273-33(C)(1)
	Container must be closed, structurally sound, compatible with the contents of the thermostat, and lack evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions, and be reasonably designed to prevent the escape of mercury into the environment by volatilization or any other means.		
	May remove the mercury-containing ampule or the open original housing holding the mercury from mercury-containing equipment and manage and dispose of it in accordance with regulations.		40 *CFR* 273.33(c)(2) – (4) *OAC* 3745-273-33(C)(2) – (4)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Management of universal waste thermostats or other mercury-containing equipment (continued)	Mercury-containing equipment or a container in which the equipment is contained must be labeled or marked clearly with any of the following phrases: "Universal Waste – Mercury-Containing Equipment" or Waste Mercury-Containing Equipment" or "Used Mercury-Containing Equipment."		40 *CFR* 273.34(d)(1) *OAC* 3745-273-34(D)(1)
	Mercury-containing thermostats or containers containing only these thermostats must be labeled or marked clearly with any of the following phrases: "Universal Waste – Mercury Thermostat(s)" or "Waste Mercury Thermostat(s)" or "Used Mercury Thermostat(s)."		40 *CFR* 273.34(d)(2) *OAC* 3745-273-34(D)(2)
Management of universal waste lamps (fluorescent, mercury vapor)	A large quantity handler of universal waste must contain any lamp in containers or packages that are structurally sound, adequate to prevent breakage, and compatible with the contents of the lamps.	Generation of universal waste lamps [as defined in 40 *CFR* 273.9 and *OAC* 3745-273-05]—**applicable**	40 *CFR* 273.33(d)(1) *OAC* 3745-273-33(D)(1)
	Such containers and packages must remain closed and must lack evidence of leakage, spillage, or damage that could cause leakage of hazardous constituents under reasonably foreseeable conditions.		
	A large quantity handler of universal waste lamp must immediately clean up and place in a container any lamp that is broken and must place in a container any lamp that shows evidence of breakage, leakage, or damage that could cause the release of mercury or other hazardous constituents to the environment.		40 *CFR* 273.33(d)(2) *OAC* 3745-273-33(D)(2)
	Each lamp or container or package in which such lamps are contained must be labeled or marked clearly with one of the following phrases: "Universal Waste-Lamp(s)," or "Waste Lamps," or "Used Lamps."		40 *CFR* 273.34(e) *OAC* 3745-273-34(E)
	Mark or label the individual item with the date the lamp(s) became a waste, or mark or label the container or package with the date the wastes were received.		40 *CFR* 273.35(c) *OAC* 3745-273-35(C)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Management of used oil	Used oil shall not be stored in a unit other than a tank, container, or RCRA regulated unit.	Generation and storage of used oil, as defined in 40 *CFR* 279.1[*OAC* 3745-279-01(A)(12)], that meets the applicability requirements of 40 *CFR* 279.10—**applicable**	40 *CFR* 279.22(a) *OAC* 3745-279-22(A)
	Containers and aboveground tanks used to store used oil must be in good condition (no severe rusting, apparent structural defects, or deterioration); and not leaking (no visible leaks).		40 *CFR* 279.22(b)(1) and (2) *OAC* 3745-279-22(B)(1) and (2)
	Containers and aboveground tanks used to store used oil and fill pipes used to transfer used oil into USTs must be labeled or marked clearly with the words “Used Oil.”		40 *CFR* 279.22(c)(1) and (2) *OAC* 3745-279-22(C)(1)
	Upon detection of a release of used oil to the environment, a generator must stop the release; contain, clean up, and properly manage the released used oil; and, if necessary, repair or replace any leaking used oil storage containers or tanks prior to returning them to service.	Release of used oil to the environment—**applicable**	40 *CFR* 279.22(d) *OAC* 3745-279-22(D)
Management of PCB waste	Any person storing or disposing of PCB waste must do so in accordance with 40 *CFR* 761, Subpart D.	Storage or disposal of waste containing PCBs at concentrations ≥ 50 ppm—**applicable**	40 *CFR* 761.50(a)
	Any person cleaning up and disposing of PCBs shall do so based on the concentration at which the PCBs are found.	Cleanup or disposal of PCB remediation waste as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.61
Cleanup of new PCB spills	Spills shall be cleaned up in accordance with 40 *CFR* 761, Subpart G, “PCB Spill Cleanup Policy.” This policy does not apply to existing spills (old spills which occurred prior to May 4, 1987).	Release into the environment of materials containing PCBs at ≥ 50 ppm, which occurs after May 4, 1987—**applicable**	40 *CFR* 761.125
	There may be exceptional spill situations that require less stringent cleanup or a different approach to cleanup because of factors associated with the particular spill. These factors may mitigate expected exposures and risks or make cleanup to these requirements impracticable.		40 *CFR* 761.120(a)(4)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Decontamination of PCB contaminated materials prior to use, reuse, distribution in commerce, or disposal as a non-TSCA waste	Chopping (including wire chopping), distilling, filtering, oil/water separation, spraying, soaking, wiping, stripping of insulation, scraping, scarification or the use of abrasives or solvents may be used to remove or separate PCBs to the decontamination standards for liquids, concrete, or non-porous surfaces, as listed in 40 *CFR* 761.79(b).	Generation of PCB wastes, including water, organic liquids, non-porous surfaces (scrap metal from disassembled electrical equipment), concrete, and non-porous surfaces covered with porous surfaces, such as paint or coating on metal—**applicable**	40 *CFR* 761.79(b)
Decontamination of water containing PCBs to levels acceptable for discharge	For water discharged to a treatment works or to navigable waters, decontaminate to < 3 µg/L (approximately < 3 ppb)or a PCB discharge limit included in a permit issued under Sect. 304(b) or 402 of the CWA; or	Discharge of water containing PCBs to a treatment works or navigable waters—**applicable**	40 *CFR* 761.79(b)(1)(ii)
Decontamination of water containing PCBs to levels acceptable for unrestricted use	Decontaminate to ≤ 0.5 µg/L (approximately ≤ 0.5 ppb) for unrestricted use.	Release of water containing PCBs for unrestricted use—**applicable**	40 *CFR* 761.79(b)(1)(iii)
Decontamination of organic liquids or non-aqueous inorganic liquids containing PCBs	For organic liquids or non-aqueous inorganic liquids containing PCBs, decontamination standard is < 2 mg/kg (i.e., < 2 ppm) PCBs.	Release of organic liquids or non-aqueous liquid containing PCBs—**applicable**	40 *CFR* 761.79(b)(2)
Decontamination of non-porous surfaces in contact with liquid PCBs to levels acceptable for unrestricted use	For non-porous surfaces previously in contact with liquid PCBs at any concentration, where no free-flowing liquids are currently present, ≤ 10 µg PCBs per 100 square centimeters (≤ 10 µg/100 cm^2) as measured by a standard wipe test (40 *CFR* 761.123) at locations selected in accordance with Subpart P of 40 *CFR* 761.	Release of non-porous surfaces in contact with liquid PCBs at any concentration for unrestricted use—**applicable**	40 *CFR* 761.79(b)(3)(i)(A)
Decontamination of non-porous surfaces in contact with non-liquid PCBs to levels acceptable for unrestricted use	For non-porous surfaces in contact with non-liquid PCBs (including non-porous surfaces covered with a porous surface, such as paint or coating on metal), clean to Visual Standard No. 2, Near-White Blast Cleaned Surface Finish of the NACE. A person shall verify compliance with standard No. 2 by visually inspecting all cleaned areas.	Release of non-porous surfaces in contact with non-liquid PCBs for unrestricted use—**applicable**	40 *CFR* 761.79(b)(3)(i)(B)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Decontamination of non-porous surfaces in contact with liquid PCBs to levels acceptable for disposal in a TSCA smelter	For non-porous surfaces previously in contact with liquid PCBs at any concentration, where no free-flowing liquids are currently present, decontaminate to < 100 µg/100 cm^2 as measured by a standard wipe test (Sect. 761.123) at locations selected in accordance with Subpart P of 40 *CFR* 761.	Disposal of non-porous surfaces previously in contact with liquid PCBs at any concentration into a smelter operating in accordance with Sect. 761.72(b) —**applicable**	40 *CFR* 761.79(b)(3)(ii)(A)
Decontamination of non-porous surfaces in contact with non-liquid PCBs to levels acceptable for disposal in a TSCA smelter	For non-porous surfaces in contact with non-liquid PCBs (including non-porous surfaces covered with a porous surface, such as paint or coating on metal) clean to Visual Standard No. 3, Commercial Blast Cleaned Surface Finish, of the NACE. A person shall verify compliance with Standard No. 3 by visually inspecting all cleaned areas.	Disposal of non-porous surfaces in contact with non-liquid PCBs into a smelter operating in accordance with Sect. 761.72(b) —**applicable**	40 *CFR* 761.79(b)(3)(ii)(B)
Decontamination of concrete recently contaminated with PCBs	Decontamination standard for concrete is < 10 µg/100 cm^2 as measured by a standard wipe test (Sect. 761.123) if the decontamination procedure is commenced within 72 hours of the initial spill of PCBs to the concrete or portion thereof being decontaminated.	Decontamination of concrete within 72 hours of the initial spill of PCBs to the concrete—**applicable**	40 *CFR* 761.79(b)(4)
Disposal of materials previously contaminated with PCBs as non-TSCA waste	Materials from which PCBs have been removed by decontamination in accordance with 40 *CFR* 761.79, not including decontamination wastes and residuals under 40 *CFR* 761.79(g), are considered unregulated for disposal under Subpart D of TSCA (40 *CFR* 761).	Disposal of materials from which PCBs have been removed—**applicable**	40 *CFR* 761.79(a)(4)
Risk-based decontamination of PCB-containing materials	May decontaminate to an alternate risk-based decontamination standard under 40 *CFR* 761.79(h) if the standard does not pose an unreasonable risk of injury to health or the environment.	Decontamination of materials contaminated with PCBs – **applicable**	40 *CFR* 761.79(h)
Management of PCB/radioactive waste	Any person storing such waste ≥ 50 ppm PCBs must do so taking into account both its PCB concentration and radioactive properties, except as provided in 40 *CFR* 761.65(a)(1), (b)(1)(ii), and (c)(6)(i).	Generation of PCB/radioactive waste for disposal—**applicable**	40 *CFR* 761.50(b)(7)(i)
	Any person disposing of such waste must do so taking into account both its PCB concentration and its radioactive properties.		40 *CFR* 761.50(b)(7)(ii)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Management of PCB/radioactive waste (continued)	If, after taking into account only the PCB properties in the waste, the waste meets the requirements for disposal in a facility permitted, licensed, or registered by a State as a municipal or nonmunicipal nonhazardous waste landfill, then the person may dispose of such waste without regard to the PCBs, based on its radioactive properties alone.		40 *CFR* 761.50(b)(7)(ii)
	Storage		
Storage of hazardous wastes restricted from land disposal	Prohibits storage of hazardous waste restricted from land disposal unless the generator stores such waste in tanks, containers, or containment buildings on-site solely for the purpose of accumulating such quantities as necessary to facilitate proper recovery, treatment, or disposal.	Accumulation of hazardous wastes restricted from land disposal solely for purpose of accumulation of quantities as necessary to facilitate proper recovery, treatment, or disposal—**applicable**	40 *CFR* 268.50 *OAC* 3745-270-50
Temporary storage and accumulation of hazardous waste in containers on site	A generator may accumulate hazardous waste at the facility provided that: • The waste is placed in containers that comply with 40 *CFR* 265.171-173 (Subpart I) [*OAC* 3745-66-70 to -73],	Accumulation of RCRA hazardous waste on-site as defined in 40 *CFR* 260.10—**applicable**	40 *CFR* 262.34(a)(1)(i) *OAC* 3745-52-34(A)(1)(a)
	• Container is marked with the date upon which each period of accumulation begins,		40 *CFR* 262.34(a)(2) *OAC* 3745-52-34(A)(2)
	• Container is marked with the words "hazardous waste," or		40 *CFR* 262.34(a)(3) *OAC* 3745-52-34(A)(3)
	• The generator complies with the requirements in paragraph (A)(5) of rule 3745-270-07 and rules 3745-65-16, 3745-65-30 to 3745-65-37, and 3745-65-50 to 3745-65-56 of the Administrative Code.		40 *CFR* 262.34(a)(4) *OAC* 3745-52-34(A)(4)
	Generator is exempt from all requirements in rules 3745- 66-10 to 3745-66-21 and 3745-66-40 to 3745-66-48 of the Administrative Code except for paragraphs (A) and (B) of rule 3745-66-11 and rule 3745-66-14 of the Administrative Code.		40 *CFR* 262.34(a)(1) *OAC* 3745-52-34(A)(1)(e)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Temporary storage and accumulation of hazardous waste in containers on site (continued)	Container must be marked with either the words "Hazardous Wastes" or with other words that identify the contents.	Accumulation of 55 gal or less of RCRA hazardous waste or 1 qt or less of acutely hazardous waste at or near any point of generation—**applicable**	40 *CFR* 262.34(c)(1)(ii) *OAC* 3745-52-34(C)(1)(b)
	For the excess waste, must comply within 3 days with the requirements of *OAC* 3745-52-34(A) or other applicable provisions of Chapter 3745-52 of the Administrative Code. During the 3-day period, comply with *OAC* 3745-52-34(C)(1)(a) and (b). Must mark container holding excess accumulation with the date the excess accumulation began.	Accumulation of more than 55 gal of hazardous waste or more than 1 qt of acutely hazardous waste at or near any point of generation—**applicable**	40 *CFR* 262.34(c)(2) *OAC* 3745-52-34(C)(2)
Accumulation of rejected shipments of hazardous waste	A generator who receives a shipment of hazardous waste back as a rejected load or residue from a facility in accordance with a manifest discrepancy may accumulate the waste on-site in accordance with paragraphs (A) and (B) or (D), (D), and (F) of *OAC* 3745-52-34 depending on the amount of hazardous waste on-site in that calendar month.	Accumulation of RCRA hazardous waste on-site as defined in 40 *CFR* 260.10—**applicable**	40 *CFR* 262.34(m) *OAC* 3745-52-34(M)
Management of hazardous waste stored in containers	If container is not in good condition (e.g., severe rusting, structural defects) or if it begins to leak, must transfer waste into container in good condition.	Storage of RCRA hazardous waste in containers—**applicable**	40 *CFR* 264.171 *OAC* 3745-55-71
	Use container made or lined with materials compatible with waste to be stored so that the ability of the container is not impaired.		40 *CFR* 264.172 *OAC* 3745-55-72
	Keep containers closed during storage, except to add/remove waste.		40 *CFR* 264.173(a) *OAC* 3745-55-73(A)
	Open, handle, and store containers in a manner that will not cause containers to rupture or leak.		40 *CFR* 264.173(b) *OAC* 3745-55-73(B)
Inspection of RCRA container storage area	At least weekly, must inspect areas where containers are stored, looking for leaking containers and for deterioration of containers and the containment system caused by corrosion or other factors.	Storage of RCRA hazardous waste in containers—**applicable**	40 *CFR* 264.174 *OAC* 3745-55-74

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Operation of a RCRA container storage area	Area must be sloped or otherwise designed and operated to drain liquid from precipitation, or containers must be elevated or otherwise protected from contact with accumulated liquid.	Storage in containers of RCRA hazardous waste that do not contain free liquids—**applicable**	40 *CFR* 264.175(c) *OAC* 3745-55-75(C)
Storage of RCRA hazardous waste with free liquids in containers	Area must have a containment system designed and operated in accordance with 40 *CFR* 264.175(b) [*OAC* 3745-55-75(B)] as follows:	Storage of RCRA hazardous waste with free liquids or F020 to F023, F026, and F027 in containers—**applicable**	40 *CFR* 264.175(a) and (d) *OAC* 3745-55-75(A) and (D)
	• A base must underlie the containers which is free of cracks or gaps and is sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed.		40 *CFR* 264.175(b)(1) *OAC* 3745-55-75(B)(1)
	• Base must be sloped or the containment system must be otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation, unless the containers are elevated or are otherwise protected from contact with accumulated liquids.		40 *CFR* 264.175(b)(2) *OAC* 3745-55-75(B)(2)
	• Must have sufficient capacity to contain 10 percent of the volume of containers or volume of largest container, whichever is greater.		40 *CFR* 264.175(b)(3) *OAC* 3745-55-75(B)(3)
	• Run-on into the system must be prevented unless the collection system has sufficient capacity to contain along with volume required for containers.		40 *CFR* 264.175(b)(4) *OAC* 3745-55-75(B)(4)
	• Spilled or leaked waste and accumulated precipitation must be removed from the sump or collection area in as timely a manner as is necessary to prevent overflow.		40 *CFR* 264.175(b)(5) *OAC* 3745-55-75(B)(5)
Storage of ignitable or reactive waste in containers	Containers holding ignitable or reactive waste must be located at least fifteen meters (fifty feet) from the facility's property line.	Storage of ignitable or reactive RCRA hazardous waste in containers—**applicable**	40 *CFR* 264.176 *OAC* 3745-55-76
Storage of incompatible waste in containers	Must not place incompatible wastes in same container unless comply with 40 *CFR* 264.17(b) [*OAC* 3745-54-17(B)].	Storage of "incompatible" RCRA hazardous wastes in containers—**applicable**	40 *CFR* 264.177(a) *OAC* 3745-55-77(A)
	Waste shall not be placed in an unwashed container that previously held an incompatible waste or material.		40 *CFR* 264.177(b) *OAC* 3745-55-77(B)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Storage of incompatible waste in containers (continued)	A container holding incompatible wastes must be separated from any waste or nearby materials or must protect them from one another by using a dike, berm, wall, or other device.		40 *CFR* 264.177(c) *OAC* 3745-55-77(C)
Temporary storage or treatment of hazardous waste in tanks	Assess tank systems integrity as detailed in 40 *CFR* 264.191 [*OAC* 3745-55-91] and ensure that existing and new tanks have sufficient structural strength that is compatible with the waste to prevent collapse or rupture.	Storage of RCRA hazardous waste in a tank (any portable device in which a material is stored, transported, or disposed of or handled) for a period greater than 90 days before treatment, disposal, or storage elsewhere—**applicable**	40 *CFR* 264.191 *OAC* 3745-55-91
	Design and install tanks and tank systems in accordance with specifications detailed in 40 *CFR* 264.192 [*OAC* 3745-55-92].		40 *CFR* 264.192 *OAC* 3745-55-92
	Provide tanks with secondary containment leak detection system controls in accordance with 40 *CFR* 264.193 [*OAC* 3745-55-93].		40 *CFR* 264.193 *OAC* 3745-55-93
	Operate tanks and tank systems in accordance with the general operating requirements detailed in 40 *CFR* 264.194 [*OAC* 3745-55-94].		40 *CFR* 264.194 *OAC* 3745-55-94
	Must inspect tanks and tank systems in accordance with the schedules detailed in 40 *CFR* 264.195 [*OAC* 3745-55-95].		40 *CFR* 264.195 *OAC* 3745-55-95
	Respond to any leaks or spills from tanks systems in accordance with the response actions detailed in 40 *CFR* 264.196 [*OAC* 3745-55-96] and remove unfit tanks from further use.		40 *CFR* 264.196 *OAC* 3745-55-96
	Presents general precautions to be taken to prevent accidental ignition or reaction of ignitable or reactive wastes that are treated or stored in tanks.	Storage of ignitable or reactive hazardous wastes in tanks—**applicable**	40 *CFR* 264.198 *OAC* 3745-55-98
	Presents general precautions to be taken when dealing with incompatible wastes treated or stored in tanks.	Storage of incompatible hazardous wastes in tanks—**applicable**	40 *CFR* 264.199 *OAC* 3745-55-99
	Less stringent minimum technology requirements may be applied to tanks designated as TUs. Protection of human health and the environment must be ensured.	Management of RCRA or CERCLA remediation wastes in tanks designated as TUs—**applicable**	40 *CFR* 264.553 *OAC* 3745-57-73

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Temporary storage of RCRA remediation waste in a staging pile	May be temporarily stored (including mixing, sizing, blending, or other similar physical operations intended to prepare the wastes for subsequent management or treatment) at a facility provided that the staging pile will be designed to:	Accumulation of nonflowing hazardous remediation waste (or remediation waste otherwise subject to land disposal restrictions) as defined in 40 *CFR* 260.10—**applicable**	40 *CFR* 264.554(d)(1) *OAC* 3745-57-74
	• Facilitate a reliable, effective, and protective remedy.		40 *CFR* 264.554(d)(1)(i) *OAC* 3745-57-74(D)(1)(a)
	• Prevent or minimize releases of hazardous wastes and constituents into the environment and minimize or adequately control cross-media transfer, as necessary, to protect human health and the environment (e.g., through the use of liners, covers, run-on/run-off controls, as appropriate).		40 *CFR* 264.554(d)(1)(ii) *OAC* 3745-57-74(D)(1)(b)
	Must not place incompatible wastes in same pile unless comply with 40 *CFR* 264.17(b) [*OAC* 3745-54-17(B)].	Storage of "incompatible" remediation waste in staging pile—**applicable**	40 *CFR* 264.554(f)(1) *OAC* 3745-57-74(F)(1)
	Incompatible wastes must be separated from any waste or nearby materials or must protect them from one another by using a dike, berm, wall, or other device.		40 *CFR* 264.554(f)(2) *OAC* 3745-57-74(F)(2)
	Must not pile remediation waste on the same base where incompatible wastes or materials were previously piled, unless the base has been decontaminated sufficiently to comply with 40 *CFR* 274.17(b) [*OAC* 3745-54-17(B)].		40 *CFR* 264.554(f)(3) *OAC* 3745-57-74(F)(3)
Temporary storage of PCB waste in a non-RCRA-regulated area	Except as provided in 40 *CFR* 761.65 (b)(2), (c)(1), (c)(7), (c)(9), and (c)(10), after July 1, 1978, facilities used for the storage of PCBs and PCB Items designated for disposal shall comply with the storage unit requirements in 40 *CFR* 761.65(b)(1).	Storage of PCBs and PCB items at concentrations ≥ 50 ppm for disposal—**applicable**	40 *CFR* 761.65(b)
	The facilities shall meet the following criteria:		40 *CFR* 761.65(b)(1)
	• Adequate roof and walls to prevent rain water from reaching the stored PCBs and PCB Items;		40 *CFR* 761.65(b)(1)(i)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Temporary storage of PCB waste in a non-RCRA-regulated area (continued)	• Adequate floor that has continuous curbing with a minimum 6-inch high curb. Floor and curb must provide a containment volume equal to at least two times the internal volume of the largest PCB article or container or 25% of the internal volume of all articles or containers stored there, whichever is greater. *Note*: 6-inch minimum curbing not required for area storing PCB/radioactive waste;		40 *CFR* 761.65(b)(1)(ii)
	• No drain valves, floor drains, expansion joints, sewer lines, or openings that permit liquids to flow from curbed area.		40 *CFR* 761.65(b)(1)(iii)
	• Floors and curbing constructed of Portland cement, concrete, or a continuous, smooth, nonporous surface as defined at Sect. 761.3, which prevents or minimizes penetration of PCBs; and		40 *CFR* 761.65(b)(1)(iv)
	• Not located at site below 100-year flood water elevation.		40 *CFR* 761.65(b)(1)(v)
Temporary storage of PCB waste in a RCRA-regulated area	Does not have to meet storage unit requirements in 40 *CFR* 761.65(b)(1) provided unit is stored in compliance with RCRA and PCB spills are cleaned up in accordance with Subpart G of 40 *CFR* 761.	Storage of PCBs and PCB items at concentrations ≥ 50 ppm for disposal—**applicable**	40 *CFR* 761.65(b)(2)(i) thru (iv)
Temporary storage of PCB waste in containers	Container(s) shall be marked as illustrated in 40 *CFR* 761.45(a).	Storage of PCBs and PCB Items at concentrations ≥ 50 ppm for disposal—**applicable**	40 *CFR* 761.40(a)(1)
	Storage area must be properly marked as required by 40 *CFR* 761.40(a)(10).		40 *CFR* 761.65(c)(3)
	Any leaking PCB Items and their contents shall be transferred immediately to a properly marked nonleaking container(s).		40 *CFR* 761.65(c)(5)
	Except as provided in 40 *CFR* 761.65(c)(6)(i) and (ii), container(s) shall be in accordance with requirements set forth in DOT HMR at 49 *CFR* 171-180.		40 *CFR* 761.65(c)(6)
	Items shall be dated when they are removed from service and the storage shall be managed so that PCB items can be located by this date. [Note: Date should be marked on the container.]	PCB Items (includes PCB wastes) removed from service for disposal—**applicable**	40 *CFR* 761.65(c)(8)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Temporary storage of PCB remediation waste or PCB bulk product waste in a TSCA waste pile	Waste must be placed and managed in accordance with the design and operation standards, including liner and cover requirements and run-off control systems, in 40 *CFR* 761.65(c)(9).	Storage of PCB remediation waste or PCB bulk product waste at cleanup site or site of generation**—applicable**	40 *CFR* 761.65(c)(9)(i)
	Requirements of 40 *CFR* 761.65(c)(9) of this part may be modified under the risk-based disposal option of Sect. 761.61(c).		40 *CFR* 761.65(c)(9)(iv)
Risk-based storage of PCB remediation waste or bulk product waste prior to disposal	May store in a manner other than prescribed in 40 *CFR* 761.65 if the method will not pose an unreasonable risk of injury to health or the environment.	Storage of PCB remediation waste or bulk product waste prior to disposal**—applicable**	40 *CFR* 761.61(c) 40 *CFR* 761.62(c)
Storage of PCB/radioactive waste in containers	For liquid wastes, containers must be nonleaking.	Storage of PCB/radioactive waste in containers other than those meeting DOT HMR performance standards**—applicable**	40 *CFR* 761.65(c)(6)(i)(A)
	For nonliquid wastes, containers must be designed to prevent buildup of liquids if such containers are stored in an area meeting the containment requirements of 40 *CFR* 761.65(b)(1)(ii); and		40 *CFR* 761.65(c)(6(i)(B)
	For both liquid and nonliquid wastes, containers must meet all regulations and requirements pertaining to nuclear criticality safety.		40 *CFR* 761.65(c)(6)(i)(C)
Preparation of solid LLW for storage	Shall be packaged in a manner that provides containment and protection for the duration of the anticipated storage period and until disposal is achieved or until waste has been removed from container.	Management and storage of LLW in containers at a DOE facility—**TBC**	DOE M 435.1-1 IV.L(1)(a)
	Vents or other measures shall be provided if the potential exists for pressurizing or generating flammable or explosive concentrations of gases within the waste container. Containers shall be marked such that their contents can be identified.		DOE M 435.1-1 IV.L(1)(b) and (c)
Temporary staging and storage of LLW	Ensure radioactive waste is stored in a manner that protects the public, workers, and the environment and that the integrity of waste storage is maintained for expected time of storage.	Management and storage of LLW at a DOE facility—**TBC**	DOE M 435.1-1 I.F(13)
	Shall not be readily capable of detonation, explosive decomposition, reaction at anticipated pressures and temperatures, or explosive reaction with water.		DOE M 435.1-1 IV.N(1)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Temporary staging and storage of LLW (continued)	Shall be stored in a location and manner that protects the integrity of waste for the expected time of storage.		DOE M 435.1-1 IV.N(3)
	Shall be managed to identify and segregate LLW from mixed waste.		DOE M 435.1-1 IV.N(6)
	Staging of LLW shall be for the purpose of accumulation of such quantities of waste as necessary to facilitate transportation, treatment, and disposal.		DOE M 435.1-1 IV.N(7)
Treatment/Disposal			
Disposal of RCRA-prohibited hazardous waste in a land-based unit	May be land disposed only if it meets the applicable requirements in the table "Treatment Standards for Hazardous Waste" at 40 *CFR* 268.40 (*OAC* 3745-270-40) before land disposal. The table lists either "total waste" standards, "waste-extract" standards, or "technology-specific" standards [as detailed further in 40 *CFR* 268.42 (*OAC* 3745-270-42)].	Land disposal, as defined in 40 *CFR* 268.2, of RCRA prohibited waste [as listed in 40 *CFR* 268.20 to .39 (*OAC* 3745-270-20 to -39)]—**applicable**	40 *CFR* 268.40(a) *OAC* 3745-270-40(A) 40 *CFR* 268.30 to 268.40 *OAC* 3745-270-30 to -40 40 *CFR* 268.42 *OAC* 3745-270-42
	For characteristic wastes (D001 – D043) that are subject to the treatment standards, all underlying hazardous constituents must meet the UTSs specified in 40 *CFR* 268.48 (*OAC* 3745-270-48).	Land disposal of restricted RCRA characteristic wastes (D001-D043) that are not managed in a wastewater treatment unit that is regulated under the CWA or is CWA equivalent, or that are injected into a Class I nonhazardous injection well—**applicable**	40 *CFR* 268.40(e) *OAC* 3745-270-40(E) 40 *CFR* 268.48 *OAC* 3745-270-48
	May be land disposed if the wastes no longer exhibit a characteristic at the point of land disposal, unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* 628.40 (*OAC* 3745-270-48), or are D003 reactive cyanide.	Land disposal of RCRA-restricted characteristic wastes—**applicable**	40 *CFR* 268.1(c)(4)(iv) *OAC* 3745-270-01 (C)(4)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal of RCRA-prohibited hazardous waste in a land-based unit *Debris*	May be land disposed if treated prior to disposal as provided under the "Alternative Treatment Standards for Hazardous Debris" in 40 *CFR* 268.45(a)(1)-(5) [*OAC* 3745-270-45(A)(1)-(5)] unless it is determined under 40 *CFR* 261.3(f)(2) [*OAC* 3745-51-03(F)(2)] that the debris is no longer contaminated with hazardous waste or the debris is treated to the waste specific treatment standard provided in 40 *CFR* 268.40 (*OAC* 3745-270-40) for the waste contaminating the debris.	Land disposal, as defined in 40 *CFR* 268.2 (*OAC* 3745-270-02), of RCRA-restricted hazardous debris—**applicable**	40 *CFR* 268.45(a) *OAC* 3745-270-45(A)
	The hazardous debris must be treated for each "contaminant subject to treatment," which must be determined in accordance with 40 *CFR* 268.45(b) [*OAC* 3745-270-45(B)].		40 *CFR* 268.45(b) *OAC* 3745-270-45(B)
Soils	May be land disposed if treated prior to disposal according to the alternative treatment standards of 40 *CFR* 268.49(c) [*OAC* 3745-270-49(C)] or according to the UTSs specified in 40 *CFR* 268.48 (*OAC* 3745-270-48) applicable to the listed hazardous waste and/or applicable characteristic of hazardous waste if the soil is characteristic.	Land disposal, as defined in 40 *CFR* 268.2 (*OAC* 3745-270-02), of RCRA-restricted hazardous soils—**applicabl**e	40 *CFR* 268.49(b) and (c) *OAC* 3745-270-49(B) and (C)
Variance from a treatment standard for RCRA restricted hazardous wastes	A variance from a treatment standard may be used if it is: • Not physically possible to treat the waste to the level specified in the treatment standard, or by the method specified as the treatment standard; or • Inappropriate to require the waste to be treated to the level specified in the treatment standard or by the method specified as the treatment standard even though such treatment is technically possible. *NOTE:* Variance approval will be granted through the DFF&O document approval process and included in the appropriate DFF&O document.	Generation of a RCRA hazardous waste requiring treatment prior to land disposal—**applicable**	40 *CFR* 268.44 *OAC* 3745-270-44

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal of treated hazardous debris	Debris treated by one of the specified extraction or destruction technologies on Table 1 of this section and which no longer exhibits a characteristic is not a hazardous waste and need not be managed in RCRA Subtitle C facility. Hazardous debris contaminated with listed waste that is treated by an immobilization technology must be managed in a RCRA Subtitle C facility.	Treated debris contaminated with RCRA-listed or characteristic waste—**applicable**	40 *CFR* 268.45(c) *OAC* 3745-270-45(C)
Disposal of hazardous debris treatment residues	Except as provided in 40 *CFR* 268.45(d)(2) and (d)(4) [*OAC* 3745-270-45(D)(2) and (D)(4)], treatment residues must be separated from the treated debris using simple physical or mechanical means, and such residues are subject to the waste-specific treatment standards for the waste contaminating the debris. Layers of debris removed by spalling are hazardous debris that remain subject to the treatment standards.	Residues from the treatment of hazardous debris—**applicable**	40 *CFR* 268.45(d)(1) – (5) *OAC* 3745-270-45(D)(1) – (5)
Prohibition of dilution to meet LDRs	Except as provided under 40 *CFR* 268.3(b) [*OAC* 3745-270-03(B)], must not in any way dilute a restricted waste or the residual from treatment of a restricted waste as a substitute for adequate treatment to achieve compliance with land disposal restriction levels.	Land disposal, as defined in 40 *CFR* 268.2 (*OAC* 3745-270-02), of RCRA-restricted hazardous soils—**applicabl**e	40 *CFR* 268.3(a) *OAC* 3745-270-03(A)
Disposal of bulk or containerized hazardous liquids	The placement of bulk or noncontainerized liquid hazardous waste or hazardous waste containing free liquids (whether or not sorbents have been added) in any landfill is prohibited.	Placement of bulk or containerized hazardous waste liquids in a landfill—**applicable**	40 *CFR* 264.314(a) *OAC* 3745-57-14(A)
	Must use the Paint Filter Liquids Test to demonstrate the absence or presence of free liquids in either a containerized or a bulk waste.		40 *CFR* 264.314(b) *OAC* 3745-57-14(B)
	Containers holding free liquids must not be placed in a landfill, unless:		40 *CFR* 264.314(c) *OAC* 3745-57-14(C)
	• All free-standing liquid has been removed by decanting, or other methods; or has been mixed with sorbent or solidified so that free-standing liquid is no longer observed; or has been otherwise eliminated; or		40 *CFR* 264.314(c)(1) *OAC* 3745-57-14(C)(1)
	• Container is very small, such as an ampule; or		40 *CFR* 264.314(c)(2) *OAC* 3745-57-14(C)(2)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal of bulk or containerized hazardous liquids (continued)	• Container is designed to hold free liquids for use other than storage, such as a battery or capacitor; or		40 *CFR* 264.314(c)(3) *OAC* 3745-57-14(C)(3)
	• Container is a lab pack as defined in 40 *CFR* 264.316 [*OAC* 3745-57-16] and is disposed of in accordance with 40 *CFR* 264.316 [*OAC* 3745-57-16].		40 *CFR* 264.314(c)(4) *OAC* 3745-57-14(C)(4)
	Sorbents used to treat free liquids to be disposed of in landfills must be nonbiodegradable as described in 40 *CFR* 264.314(d)(1) [*OAC* 3745-57-14(D)(1)].		40 *CFR* 264.314(d) *OAC* 3745-57-14(D)
	The placement of any liquid which is not a hazardous waste in a landfill is prohibited unless it is demonstrated that the only reasonably available alternative is placement in a landfill or unlined surface impoundment which contains or may contain hazardous waste and such placement will not present a risk of contamination of any underground source of drinking water.		40 *CFR* 264.314(e) *OAC* 3745-57-14(E)
	Unless they are very small, containers must be either at least 90 percent full when placed in the landfill, or crushed, shredded, or similarly reduced in volume to the maximum practical extent before burial in the landfill.		40 *CFR* 264.315 *OAC* 3745-57-15
	Small containers of hazardous waste in overpacked drums (lab packs) may be placed in a landfill if the requirements of this section are met.		40 *CFR* 264.316 *OAC* 3745-57-16
Disposal of hazardous wastes F020, F021, F022, F023, F026, and F027 listed wastes	Disposal of F020, F021, F022, F023, F026, and F027 wastes in a hazardous waste landfill is not permitted unless comply with the substantive requirements for waste management of 40 *CFR* 264.317 [*OAC* 3745-57-17].	Disposal of hazardous wastes F020, F021, F022, F023, F026, and F027——**applicable**	40 *CFR* 264.317 *OAC* 3745-57-17
Disposal requirements for particular RCRA waste forms and types	Must not be placed in a landfill unless the waste and the landfill meet applicable provisions of 40 *CFR* 268 and: • The resulting waste, mixture, or dissolution of material no longer is reactive or ignitable. • 40 *CFR* 264.17(b) [*OAC* 3745-54-17(B)] is complied with.	Disposal of ignitable or reactive RCRA waste—**applicable**	40 *CFR* 264.312(a) *OAC* 3745-57-12(A)

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Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal requirements for particular RCRA waste forms and types (continued)	May be landfilled without meeting 40 *CFR* 264.312(a) [*OAC* 3745-57-12(A)], provided wastes are disposed of in such a way that they are protected from any materials or conditions which may cause them to ignite; Must be disposed of in nonleaking containers which are carefully handled and placed to avoid heat, sparks, rupture, or any other condition that might cause ignition of the wastes; Must be covered daily with soil or other noncombustible material to minimize the potential of ignition; Must not be disposed of in cells that contain or will contain other wastes which may generate heat sufficient to cause ignition of the waste and	Disposal of ignitable or reactive RCRA waste [except for prohibited wastes which remain subject to treatment standards in 40 *CFR* 268.40 *et seq.*]—**applicable**	40 *CFR* 264.312(b) *OAC* 3745-57-12(B)
	Must not be placed into a cell unless 40 *CFR* 264.17(b) [*OAC* 3745-54-17(B)] is complied with.	Disposal of incompatible wastes in a RCRA landfill—**applicable**	40 *CFR* 264.313 *OAC* 3745-57-13
Treatment and disposal of ignitable, reactive, or incompatible RCRA wastes	Must take precautions to prevent accidental ignition or reaction of waste, and waste must be separated and protected from sources of ignition or reaction.	Operation of a RCRA facility that treats, stores, or disposes of ignitable, reactive, or incompatible wastes—**applicable**	40 *CFR* 264.17(a) *OAC* 3745-54-17(A)
	Must take precautions to prevent reactions that: • Generate extreme heat, pressure, fire or explosion, or violent reactions. • Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment. • Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions. • Damage the structural integrity of the device or facility. • Through other like means threaten human health or the environment.		40 *CFR* 264.17(b) *OAC* 3745-54-17(B)
Disposal of solid wastes	Except as provided in paragraph (D) of *OAC* 3745-27-02, no person shall establish or modify a solid waste disposal facility without meeting the substantive criteria as follows:	Management and disposal of solid waste—**applicable**	*OAC* 3745-27-02(A)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal of solid wastes (continued)	Disposal of solid wastes shall only be by the following methods or combination thereof:		*OAC* 3745-27-05(A)
	• Disposal at a licensed sanitary landfill facility		*OAC* 3745-27-05(A)(1)
	• Incinerating at a licensed incinerator		*OAC* 3745-27-05(A)(2)
	• Composting at a licensed composting facility		*OAC* 3745-27-05(A)(3)
	• Alternative disposal methods either as engineered fill or land application, provided use will not create a nuisance or harm human health or the environment and is capable of complying with other applicable laws.		*OAC* 3745-27-05(A)(4)
Prohibition on open dumping of solid wastes	Temporary storage of putrescible solid wastes in excess of seven days, or temporary storage of any solid wastes where such storage causes a nuisance or health hazard shall be considered open dumping.	Temporary storage of solid waste prior to collection for disposal or transfer—**applicable**	*OAC* 3745-27-03(A)(2)
	No person shall conduct, permit, or allow open dumping. In the event that open dumping is or has occurred, person(s) responsible shall promptly remove and dispose or otherwise manage the solid waste and shall submit verification that the waste has been properly managed.	Management and disposal of solid waste**—applicable**	*OAC* 3745-27-05(C)
Treatment of LLW	Waste treatment to provide more stable waste forms and to improve the long-term performance of a LLW disposal facility shall be implemented as necessary to meet performance objectives of the disposal facility.	Generation of LLW for disposal at a DOE LLW facility**—TBC**	DOE M 435.1-1 IV.O
Treatment of uranium-bearing LLW	Such wastes shall be properly conditioned so that the generation and escape of biogenic gases will not cause the emission or dose limits in paragraph 4.h.(1) of DOE Order 458.1 to be exceeded and that biodegradation within the facility will not result in premature structural failure..	Placement of potentially biodegradable contaminated wastes in a long-term management facility—**TBC**	DOE Order 458.1(h)(1)(d)(3)
Disposal of LLW in a landfill	Waste placement into disposal units shall minimize voids between containers with the voids filled to the extent practicable. Uncontainerized bulk waste shall be placed to minimize voids and subsidence.	Operation of a LLW disposal facility at a DOE site**—TBC**	DOE M 435.1-1 (IV)(P)(6)(c)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal of LLW in a landfill (continued)	Void spaces within the waste and, if containers are used, between the waste and its container shall be reduced to the extent practical.		DOE M 435.1-1 (IV)(G)(1)(d)(1)
Disposal of solid LLW at DOE facilities	Shall meet waste acceptance requirements before it is transferred to the receiving facility.	Generation of LLW for disposal at a DOE facility—**TBC**	DOE M 435.1-1 (IV)(J)(2)
Disposal of beryllium-containing waste or beryllium-contaminated equipment and other items	Must control the generation of beryllium-containing waste or beryllium-contaminated equipment and other items through the application of waste minimization principles.	Generation of beryllium-containing waste or beryllium-contaminated equipment and other items—**applicable**	10 *CFR* 850.32(a)
	Dispose of in sealed, impermeable bags, containers, or enclosures to prevent the release of beryllium dust during handling and transportation. Bags, containers, and enclosures must be labeled according to 10 *CFR* 850.38.		10 *CFR* 850.32(b)
Disposal of refrigeration equipment	With the exception of the substitutes in the end uses listed in 40 *CFR* 82.154(a)(1)(i) – (vi), no person maintaining, servicing, repairing, or disposing of appliances may knowingly vent or otherwise release into the environment any refrigerant or substitute from such appliances.	Appliances that contain Class I or II substances used as a refrigerant—**applicable**	40 *CFR* 82.154(a)(1)
	De minimis releases associated with good faith attempts to recycle or recover refrigerants are not subject to this prohibition.		40 *CFR* 82.154(a)(2)
	No person may dispose of such appliances, except for small appliances, MVACs, and MVAC-like appliances, without: • Observing the required practices set forth in 40 *CFR* 82.156, and • Using equipment that is certified for that type of appliance pursuant to 40 *CFR* 82.158.		40 *CFR* 82.154(b)
Disposal of asbestos-containing waste material (e.g., transite siding, pipe lagging, insulation, ceiling tiles)	All asbestos-containing waste material must be adequately wetted, collected, sealed in leak-proof containers, and deposited as soon as practicable at an approved waste disposal site operated in accordance with Sect. 61.154 [*OAC* 3745-20-06] or a site that converts RACM and asbestos-containing waste material into nonasbestos (asbestos-free) material according to provisions of 40 *CFR* 61.155 [*OAC* 3745-20-13].	Removal and disposal of RACM, except Category I nonfriable asbestos-containing material—**applicable**	40 *CFR* 61.150(b)(1) - (2) *OAC* 3745-20-05(A)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal of asbestos-containing waste material (e.g., transite siding, pipe lagging, insulation, ceiling tiles) (continued)	May use an alternative emission control and waste treatment method that will control asbestos emissions equivalent to currently required methods, the alternative method is suitable for the intended application, and the alternative method will not violate other regulations and will not result in increased water or land pollution or occupational hazards.		40 *CFR* 61.150(a)(4) *OAC* 3745-20-05(B)(4)
Exclusions for disposal or reuse of construction and demolition debris, or "clean hard fill" [as defined in *OAC* 3745-400-01(E)]	Construction and demolition debris facility requirements do not apply to construction and demolition debris or clean hard fill used in one or more of the following ways: • Any construction site where construction debris and trees and brush removed in clearing the construction site are used as fill material on the site where the materials are generated or removed. • Any site where clean hard fill is used, either alone or in conjunction with clean soil, sand, gravel, or other clean aggregates, in legitimate fill operations.	Use of construction and demolition debris or clean hard fill at a site—**applicable**	*OAC* 3745-400-03
	• Any site where debris is not disposed, such as where debris is reused or recycled in a beneficial manner, or stored for a temporary period remaining unchanged and retrievable.		*OAC* 3745-400-03
Disposal of construction and demolition debris	Shall be disposed of only in an authorized construction and demolition debris facility or solid waste disposal facility; by means of open burning if permitted as provided in *OAC* 3745-19; or by other methods provided such methods are demonstrated to be capable of disposing without creating a nuisance or health hazard, without causing water pollution, and without violating any regulations under Chapters 3745, 3704 or 3734.	Disposal of construction and demolition debris—**applicable**	*OAC* 3745-400-04(A) and (B)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal of construction and demolition debris as "clean hard fill"	Clean hard fill [does not include materials contaminated with hazardous, solid, or infectious waste] consisting of reinforced or nonreinforced concrete, asphalt concrete, brick [includes but is not limited to refractory brick and mortar], block, tile, or stone shall be managed in one or more of the following ways: • Recycled into usable construction material • Disposed in licensed construction and demolition debris or other waste facilities. • Used in legitimate fill operations for construction purposes or to bring the site up to consistent grade, on the site of generation, or on a site other than the site of generation, pursuant to Paragraph (C) of *OAC* 3745-400-05.	Use of clean hard fill to bring a construction site up to consistent grade—**applicable**	*OAC* 3745-400-05(A)
	Clean hard fill may be stored for a period of less than two years. "Stored" means held in a manner remaining retrievable and substantially unchanged. Clean hard fill piled adjacent to a construction materials processing facility shall not be considered stored for more than 2 years if the pile is active, i.e., if clean hard fill material is added to and removed from the pile within a 2 year period.		*OAC* 3745-400-05(B)
Disposal of TSCA PCB waste in a chemical waste landfill	Must be placed in manner that will prevent damage to containers or articles. Other wastes that are not chemically compatible with PCBs shall be segregated from the PCBs throughout the handling and disposal process.	Disposal of PCBs or PCB Items in chemical waste landfill—**applicable**	40 *CFR* 761.75(b)(8)(i)
	May be disposed of provided such waste is pretreated and/or stabilized (e.g., chemically fixed, evaporated, mixed with dry inert absorbent) to reduce its liquid content or increase its solid content so that a nonflowing consistency is achieved to eliminate the presence of free liquids prior to final disposal.	Disposal of PCB bulk liquids not exceeding 500 ppm—**applicable**	40 *CFR* 761.75(b)(8)(ii)
	May be disposed of if each container is surrounded by an amount of inert sorbent material capable of absorbing all of the liquid contents of the container.	Disposal of PCB container with liquid PCB between 50 and 500 ppm—**applicable**	40 *CFR* 761.75(b)(8)(ii)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal of TSCA PCB waste in a chemical waste landfill (continued)	Ignitable wastes shall not be disposed of in chemical waste landfills.	Disposal of PCBs in a chemical waste landfill—**applicable**	40 *CFR* 761.75(b)(8)(iii)
Performance-based disposal of PCB remediation waste	Shall be disposed according to 40 *CFR* 761.60(a) or (e), or decontaminated in accordance with 40 *CFR* 761.79.	Disposal of liquid PCB remediation waste—**applicable**	40 *CFR* 761.61(b)(1)
	May dispose by one of the following methods:	Disposal of nonliquid PCB remediation waste (as defined in 40 *CFR* 761.3)—**applicable**	40 *CFR* 761.61(b)(2)
	• In a high-temperature incinerator approved under 40 *CFR* 761.70(b);		40 *CFR* 761.61(b)(2)(i)
	• By an alternate disposal method under 40 *CFR* 761.60(e);		
	• In a chemical waste landfill under 40 *CFR* 761.75;		
	• In a facility under 40 *CFR* 761.77; or		
	• Through decontamination in accordance with 40 *CFR* 761.79.		40 *CFR* 761.61(b)(2)(ii)
Risk-based disposal of PCB remediation waste	May dispose of in a manner other than prescribed in 40 *CFR* 761.61(a) or (b) if the method will not pose an unreasonable risk of injury to health or the environment.	Disposal of PCB remediation waste—**applicable**	40 *CFR* 761.61(c)
Disposal of PCB decontamination waste and residues	Shall be disposed at their existing PCB concentration unless otherwise specified in 40 *CFR* 761.79(g).	PCB decontamination waste and residues for disposal—**applicable**	40 *CFR* 761.79(g)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal of PCB liquids (e.g., from drained electrical equipment)	Must be disposed of in an incinerator which complies with 40 *CFR* 761.70, except:	PCB liquids at concentrations ≥ 50 ppm—**applicable**	40 *CFR* 761.60(a)
	For mineral oil dielectric fluid, may be disposed in a high efficiency boiler according to 40 *CFR* 761.71(a).	PCB liquids at concentrations ≥ 50 ppm and < 500 ppm—**applicable**	40 *CFR* 761.60(a)(1)
	For liquids other than mineral oil dielectric fluid, may be disposed in a high efficiency boiler according to 40 *CFR* 761.71(b).		40 *CFR* 761.60(a)(2)
Disposal of PCB-contaminated precipitation, condensation, or leachate	May be disposed in a chemical waste landfill which complies with 40 *CFR* 761.75 if:	PCB liquids at concentrations ≥ 50 ppm from incidental sources and associated with PCB Articles or nonliquid PCB wastes—**applicable**	40 *CFR* 761.60(a)(3)
	• Disposal does not violate 40 *CFR* 268.32(a) or 268.42(a)(1), and		40 *CFR* 761.60(a)(3)(i)
	• Liquids do not exceed 500 ppm and are not ignitable waste as described in 40 *CFR* 761.75(b)(8)(iii).		40 *CFR* 761.60(a)(3)(ii)
Disposal of PCB transformers	Shall be disposed of in one of the following:	Disposal of PCB transformers that contain PCBs at concentrations of ≥ 500 ppm in the contaminating fluid as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.60(b)(1)
	• An incinerator that complies with 40 *CFR* 761.70.		40 *CFR* 761.60(b)(1)(i)(A)
	• A chemical waste landfill that is compliant with 40 *CFR* 761.75 provided all free-flowing liquid is removed from the transformer, the transformer is filled with a solvent, the transformer is allowed to stand for at least 18 continuous hours, and then the solvent is thoroughly removed.		40 *CFR* 761.60(b)(1)(i)(B)
Performance-based disposal of PCB bulk product waste	May dispose of by one of the following:	Disposal of PCB bulk product waste as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.62(a)
	• In an incinerator under 40 *CFR* 761.70,		40 *CFR* 761.62(a)(1)
	• In a chemical waste landfill under 40 *CFR* 761.75,		40 *CFR* 761.62(a)(2)
	• In a hazardous waste landfill under Sect. 3004 or Sect. 3006 of RCRA,		40 *CFR* 761.62(a)(3)
	• Under alternate disposal under 40 *CFR* 761.60(e),		40 *CFR* 761.62(a)(4)
	• In accordance with decontamination provisions of 40 *CFR* 761.79.		40 *CFR* 761.62(a)(5)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Performance-based disposal of PCB bulk product waste (continued)	• In accordance with the thermal decontamination provisions of 40 *CFR* 761.79(e)(6) for metal surfaces in contact with PCBs.		40 *CFR* 761.62(a)(6)
Risk-based disposal of PCB bulk product waste	May dispose of in a manner other than that prescribed in 40 *CFR* 761.62(a) if approved in writing by EPA and method will not pose an unreasonable risk of injury to health or the environment.	Disposal of PCB bulk product waste as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.62(c)
Disposal of PCB bulk product waste in solid waste landfill	May dispose of the following in a municipal or non-municipal nonhazardous waste landfill:	Disposal of nonliquid PCB bulk product waste listed in 40 *CFR* 761.62(b)(1)—**applicable**	40 *CFR* 761.62(b)(1)
	• Plastics (such as plastic insulation from wire or cable; radio, television and computer casings; vehicle parts; or furniture laminates); preformed or molded rubber parts and components; applied dried paints, varnishes, waxes or other similar coatings or sealants; caulking; Galbestos; non-liquid building demolition debris; or non-liquid PCB bulk product waste from the shredding of automobiles or household appliances from which PCB small capacitors have been removed (shredder fluff)		40 *CFR* 761.62(b)(1)(i)
	• Other PCB bulk product waste, sampled in accordance with the protocols set out in subpart R of 40 *CFR* Part 761, that leaches PCBs at < 10 μg/L of water measured using a procedure used to simulate leachate generation		40 *CFR* 761.62(b)(1)(ii)
	May dispose of in a municipal or non-municipal nonhazardous waste landfill if:	PCB bulk product waste not meeting conditions of 40 *CFR* 761.62(b)(1) (e.g., paper/felt gaskets contaminated by liquid PCBs) – **applicable**	40 *CFR* 761.62(b)(2)
	• The PCB bulk product waste is segregated from organic liquids disposed of in the landfill, and		40 *CFR* 761.62(b)(2)(i)
	• Leachate is collected from the landfill and monitored for PCBs.		40 *CFR* 761.62(b)(2)(ii)
Disposal of fluorescent light ballasts	Must be disposed of in a TSCA disposal facility as bulk product waste under 40 *CFR* 761.62 or in accordance with the decontamination provisions of 40 *CFR* 761.79.	Generation for disposal of fluorescent light ballasts containing PCBs in the potting material—**applicable**	40 *CFR* 761.60(b)(6)(iii)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal of PCB-contaminated electrical equipment (except capacitors)	Must remove all free-flowing liquid from the electrical equipment and dispose of the removed liquid in accordance with 40 *CFR* 761.60(a) and	Generation of PCB-contaminated electrical equipment (as defined in 40 *CFR* 761.3) for disposal—**applicable**	40 *CFR* 761.60(b)(4)
	Dispose of by one of the following methods: • In a facility managed as a municipal solid waste or non-municipal nonhazardous waste facility; • In an industrial furnace operating in compliance with 40 *CFR* 761.72; or • In a disposal facility under 40 *CFR* 761.60.	Drained PCB-contaminated electrical equipment including any residual liquids—**applicable**	40 *CFR* 761.60(b)(4)(i)
Disposal of PCB capacitor(s)	Any person must assume that a capacitor manufactured prior to July 2, 1979, whose PCB concentration is not established, contains ≥ 500 ppm PCBs. If the date of manufacture is unknown, any person must assume the capacitor contains ≥ 500 ppm PCBs.	Generation of PCB capacitors with ≥ 500 ppm PCBs for disposal—**applicable**	40 *CFR* 761.2(a)(4)
	Shall comply with all requirements of 40 *CFR* 761.60 unless it is known from label or nameplate information, manufacturer's literature, or chemical analysis that capacitor does not contain PCBs.		40 *CFR* 761.60(b)(2)(i)
	Shall dispose of in accordance with either of the following: • Disposal in an incinerator that complies with 40 *CFR* 761.70. • Disposal in a chemical waste landfill that complies with 40 *CFR* 761.75.	Generation of PCB capacitors with ≥ 500 ppm PCBs for disposal—**applicable**	40 *CFR* 761.60(b)(2)(iii)
	Shall dispose of in one of the following disposal facilities approved under 40 *CFR* 761.60: • Incinerator under 40 *CFR* 761.70 • Chemical waste landfill under 40 *CFR* 761.75 • High efficiency boiler under 40 *CFR* 761.71 • Scrap metal recovery oven or smelter under 40 *CFR* 761.72	Disposal of large capacitors that contain ≥ 50 ppm but < 500 ppm PCBs—**applicable**	40 *CFR* 761.60(b)(4)(ii)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Disposal of PCB capacitor(s) (continued)	May dispose of in municipal solid waste landfill.	Generation of PCB small capacitors (as defined in 40 *CFR* 761.3) for disposal—**applicable**	40 *CFR* 761.60(b)(2)(ii)
Disposal of PCB-contaminated articles	Must remove all free-flowing liquid from the Article, disposing of the liquid in compliance with the requirements of 40 *CFR* 761.60(a)(2) or (a)(3) and	Generation of PCB-contaminated Articles (as defined in 40 *CFR* 761.3) for disposal—**applicable**	40 *CFR* 761.60(b)(6)(ii)
	Dispose by one of the following methods: • In accordance with the decontamination provisions at 40 *CFR* 761.79; • In a facility managed as a municipal solid waste or non-municipal nonhazardous waste facility; • In an industrial furnace operating in compliance with 40 *CFR* 761.72; or • In a disposal facility under 40 *CFR* 761.60.	Disposal of PCB-contaminated articles with no free-flowing liquid—**applicable**	40 *CFR* 761.60(b)(6)(ii)(A) thru (D)
	Closure		
Closure performance standard for RCRA hazardous waste management units	Must close the facility in a manner that: • Minimizes the need for further maintenance; and	Closure of a RCRA hazardous waste management unit—**applicable**	40 *CFR* 264.111(a) *OAC* 3745-55-11(A)
	• Controls, minimizes, or eliminates, to the extent necessary to protect human health and environment, post-closure escape of hazardous waste, hazardous constituents, contaminated run-off, or hazardous waste decomposition products to ground or surface waters or to the atmosphere.		40 *CFR* 264.111(b) *OAC* 3745-55-11(B)
	• Complies with the substantive closure requirements of 40 *CFR* 264 [*OAC* 3745-54 to 3745-57 and 3745-205] for particular type of facility including, but not limited to, requirements of Sects. 264.178 (container storage area) [*OAC* 3745-55-78], 264.197 (tanks) [*OAC* 3745-55-97], 264.310 (landfills) [*OAC* 3745-57-10], and 264.554 (remediation waste piles) [*OAC* 3745-56-58].		40 *CFR* 264.111(c) *OAC* 3745-55-11(C)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Closure performance standard for RCRA hazardous waste management units (continued)	Must have a closure plan identifying the steps necessary to perform partial and/or final closure of the facility at any point during its active life and must amend the plan as necessary.		40 *CFR* 264.112 *OAC* 3745-55-12
	During the partial and final closure periods, all contaminated equipment, structures, and soils must be properly disposed or decontaminated.	Closure of a RCRA hazardous waste management unit—**applicable**	40 *CFR* 264.114 *OAC* 3745-55-14
Postclosure care of RCRA hazardous waste management unit	Postclosure care in accordance with the substantive requirements of *OAC* 3745-55-17 (A)(1) must begin after closure and continue for at least 30 years after that date. The Director may shorten or extend the postclosure period as indicated to protect human health and the environment.	Closure of a RCRA hazardous waste disposal unit—**applicable**	40 *CFR* 264.117(a)(1) and (2) *OAC* 3745-55-17(A)(1) and (2)
Closure of a RCRA container storage unit	Must remove all hazardous waste and residues from containment system. Remaining containers, liners, bases, and soil containing or contaminated with hazardous waste or residues must be decontaminated or removed.	Closure of a RCRA hazardous waste container storage area—**applicable**	40 *CFR* 264.178 *OAC* 3745-55-78
Closure of RCRA hazardous waste tanks	At closure, remove all hazardous waste and hazardous waste residues from tanks, discharge control equipment, and discharge confinement structures.	Management of RCRA hazardous waste in tanks—**applicable**	40 *CFR* 264.197(a) *OAC* 3745-55-97(A)
	If all contaminated contents cannot be removed, must consider the tank system a landfill and close the facility and perform post-closure care in accordance with the landfill closure requirements of 40 *CFR* 264.310 [*OAC* 3745-57-10].		40 *CFR* 264.197(b) *OAC* 3745-55-97(B)
	If a tank system does not have secondary containment, such a system is considered a landfill and closure and postclosure plans must reflect this.		40 *CFR* 264.197(c) *OAC* 3745-55-97(C)
Closure of a RCRA remediation waste staging pile	Must be closed by removing or decontaminating all remediation waste, contaminated containment system components, and structures and equipment contaminated with waste and leachate.	Storage of remediation waste in staging pile located in previously contaminated area—**applicable**	40 *CFR* 264.554(j)(1) *OAC* 3745-57-74(J)(1)
	Must decontaminate contaminated subsoils in a manner that will protect human health and the environment.		40 *CFR* 264.554(j)(2) *OAC* 3745-57-74(J)(2)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Closure of a RCRA remediation waste staging pile (continued)	Must be closed according to substantive requirements in 40 *CFR* 264.258(a) and 264.111 or 265.258(a) and 265.111 [*OAC* 3745-56-58(A) and 3745-55-11 or 3745-67-58 and 3745-66-11] by removing or decontaminating all waste residues, contaminated containment system components (liners, etc.), contaminated subsoils, and structures and equipment contaminated with waste and leachate, and managing them as hazardous waste.	Storage of remediation waste in staging pile located in an uncontaminated area—**applicable**	40 *CFR* 264.554(k) *OAC* 3745-57-74(K)
Closure of TSCA storage facility	Must close in a manner that eliminates the potential for post-closure releases of PCBs which may present an unreasonable risk to human health or the environment.	Closure of a TSCA storage facility—**applicable**	40 *CFR* 761.65(e)(1)
	Must remove or decontaminate PCB waste residues and contaminated containment system components, equipment, structures, and soils during closure in accordance with levels specified in the PCB Spills Cleanup Policy in Subpart G of 40 *CFR* 761.		40 *CFR* 761.65(e)(1)(iv)
	A TSCA/RCRA storage facility closed under RCRA is exempt from the TSCA closure requirements of 40 *CFR* 761.65(e).	Closure of a TSCA/RCRA storage facility—**applicable**	40 *CFR* 761.65(e)(3)
	Transportation[b]		
Transportation of hazardous waste on site	The generator manifesting requirements of 40 *CFR* 262.20 to 262.32(b) [*OAC* 3745-52-20 to 3745-52-23 and 3745-52-32(B)] do not apply. Generator or transporter must comply with the requirements set forth in 40 *CFR* 263.30 and 263.31 [*OAC* 3745-53-30 and 3745-53-31] in the event of a discharge of hazardous waste on a private or public right-of-way.	Transportation of hazardous wastes on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way—**applicable**	40 *CFR* 262.20(f) *OAC* 3745-52-20(F)
Transportation of hazardous materials on site	Must meet the substantive requirements of 49 *CFR* Parts 171–174, 177, and 178 or the site- or facility-specific Transportation Safety Document [i.e., *Transportation Safety Document for the On-Site Transfer of Hazardous Material at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* LPP-0021/R3, November 2008].	Transport of hazardous materials on the Portsmouth site—**TBC**	DOE Order 460.1C(4)(b)

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Transportation of radioactive waste	Shall be packed and transported in accordance with the substantive requirements of DOE Order 460.1C (*Packaging and Transportation Safety*) and DOE Order 460.2A (*Departmental Materials Transportation and Packaging Management*).	Preparation of shipment of radioactive waste—**TBC**	DOE M 435.1-1(I)(1)(E)(11)
	To the extent practicable, the volume of waste and number of shipments shall be minimized.		DOE M 435.1-1(III)(L)(2) DOE M 435.1-1(IV)(L)(2)
Transportation of PCB wastes off site	Must comply with the manifesting provisions at 40 *CFR* 761.207 through 218.	Preparation for relinquishment of control over PCB wastes by transporting or offering for transport—**applicable**	40 *CFR* 761.207(a)
Transportation of hazardous waste off site	Must comply with the generator requirements of 40 *CFR* 262.20 to 262.23 [*OAC* 3745-52-20 to 3745-52-23] for manifesting, Sect. 262.30 [*OAC* 3745-52-30] for packaging, Sect. 262.31 [*OAC* 3745-52-31] for labeling, Sect. 262.32 [*OAC* 3745-52-32] for marking, Sect. 262.33 [*OAC* 3745-52-33] for placarding, Sects. 262.40 and 262.41(a) [*OAC* 3745-52-40 and 3745-52-41] for record keeping requirements, and Sect. 262.12 [*OAC* 3745-52-12] to obtain EPA ID number.	Preparation of RCRA hazardous waste for off-site transport—**applicable**	40 *CFR* 262.10(h) *OAC* 3745-52-10(H) 40 *CFR* 262.20 to .23 *OAC* 3745-52-20 to -23 40 *CFR* 262.30 to .33 *OAC* 3745-52-30 to -33
Transportation of universal waste off site	Off-site shipments of universal waste by a large quantity handler of universal waste shall be made in accordance with 40 *CFR* 273.38 [*OAC* 3745-273-38].	Preparation of universal waste for off-site transport—**applicable**	40 *CFR* 273.38(c) *OAC* 3745-273-38(C)
	Off-site shipments to a foreign destination must comply with requirements applicable to a primary exporter in *OAC* 3745-52-10, 3745-52-53, 3745-52-56 and 3745-52-57 and export waste only upon consent of the receiving country and in conformance with the EPA "Acknowledgement of Consent" as defined in OAC 3745-52-50 to 3745-52-57. A copy of the consent must be provided to the transporter.		40 *CFR* 273.40 *OAC* 3745-273.40
Transportation of used oil off site	Except as provided in paragraphs (a) to (c) of 40 *CFR* 279.24 [*OAC* 3745-279-24(A) to (C)], generators must ensure that their used oil is transported by transporters who have obtained EPA ID numbers.	Preparation of used oil for off-site transport—**applicable**	40 *CFR* 279.24 *OAC* 3745-279-24

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Media/Location/Action	Requirements[a]	Prerequisite	Citation
Transportation of asbestos-containing waste materials off site	For asbestos-containing waste material to be transported off the facility site, label containers or wrapped materials with the name of the waste generator and location at which the waste was generated.	Preparation of asbestos-containing waste materials for off-site transport—**applicable**	40 *CFR* 61.150(a)(1)(v) *OAC* 3745-20-05(C)(1)
	Mark vehicles used to transport asbestos-containing waste material during the loading and unloading of waste so that the signs are visible. The markings must conform to the requirements of 40 *CFR* 61.149(d)(1)(i), (ii), and (iii).		40 *CFR* 61.150(c) *OAC* 3745-20-05(E)
Transportation of hazardous materials off site	Any person who, under contract with a department or agency of the Federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material, shall be subject to and must comply with all applicable provisions of the HMTA and HMR at 49 *CFR* 171 – 180 related to marking, labeling, placarding, etc.	Preparation for transport or shipment "in commerce" of a hazardous material—**applicable**	49 *CFR* 171.1(c)

[a]The requirements portion of the ARARs table is intended to provide a summary of the cited ARAR. The omission of any particular requirement does not limit the scope of the cited ARARs.
[b]The NCP at 40 *CFR* 300.400(e)(1) defines "on-site" as meaning "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for the implementation of the response action." CERCLA Sect. 104(d)(4) also states where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, these related facilities may be treated as one facility for the purpose of conducting response actions. Section 104(d)(4) allows the lead agency to manage waste transferred between such noncontiguous facilities without having to obtain a permit. Under this authority, an on-site disposal facility and any noncontiguous Portsmouth sites contaminated by past operations where future CERCLA response actions will generate waste requiring disposal at the on-site facility may potentially be considered as a single on-site unit for response purposes and movement of wastes between them would be considered on-site transportation. Off-site transportation, by definition, is not an on-site response action and is subject to all substantive, procedural, and administrative requirements of all legally applicable laws, but not to any requirements that might normally be labeled relevant and appropriate under the ARARs process.

ACM = asbestos-containing material
ALARA = as low as reasonably achievable
ARAR = applicable or relevant and appropriate requirement
BAT = best available technology
BPJ = best professional judgment
CAMU = corrective action management unit
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR = *Code of Federal Regulations*
CMBST = combustion
COE = U.S. Corps of Engineers
CWA = Clean Water Act
DCS = Derived Concentration Technical Standard
DEACT = deactivation
DFF&O = Director's Findings and Orders
DOE = U.S. Department of Energy
DOE M = U.S. Department of Energy Radioactive Waste Management Manual
DOT = U.S. Department of Transportation
EDE = effective dose equivalent
EPA = U.S. Environmental Protection Agency
HMR = Hazardous Materials Regulations
HMTA = Hazardous Materials Transportation Act of 1975 (Amendments of 1976)
ID = identification number
LDRs = land disposal restrictions
LPP = LATA/Parallax Portsmouth, LLC
LLW = low-level (radioactive) waste
MCL = maximum contaminant level
MVAC = motor vehicle air conditioning
NACE = National Association of Corrosion Engineers
NCP = National Oil and Hazardous Substances Contingency Plan
NHPA = National Historic Preservation Act of 1966
NPDES = National Pollutant Discharge Elimination System
OAC = Ohio Administrative Code
Ohio EPA = Ohio Environmental Protection Agency
PCB = polychlorinated biphenyl
POLYM = polymerization

Table B.1. ARARs and TBC Guidance for the Sitewide Waste Disposition Evaluation Project On-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

POTW = publicly owned treatment works
RACM = regulated asbestos-containing material
RAWP = remedial action work plan
RC = Ohio Revised Code
RCRA = Resource Conservation and Recovery Act of 1976
RORGS = recovery of organics
S&M = surveillance and maintenance
TBC = to be considered
TED = total effective dose
TSCA = Toxic Substances Control Act of 1976
TSD = treatment, storage, and disposal
TU = temporary unit
USC = *United States Code*
UST = underground storage tank
UTS = universal treatment standard
VOC = volatile organic compound
WAC = waste acceptance criteria

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Action	Requirements[a]	Prerequisite	Citation
General waste management and transportation activities			
Activities causing release of air pollutants	Shall not cause the emission or escape into the open air from any source or sources whatsoever of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors, or any other substances or combinations of substances in such manner or in such amounts as to endanger the health, safety, or welfare of the public, or cause unreasonable injury or damage to property.	Activities causing the release of air pollution nuisances as defined in *OAC* 3745-15-07(A) — **applicable**	*OAC* 3745-15-07
	The operation of a hazardous waste facility shall not cause, permit, or allow the emission there from of any particulate matter, dust, fumes, gas, mist, smoke, vapor, or odorous substance that unreasonably interferes with the comfortable enjoyment of life or property by persons living or working in the vicinity of the facility or that is injurious to public health.	Site where hazardous waste will be managed such that air emissions may occur — **applicable**	*RC* 3734.02(I)
Activities causing fugitive dust (particulate) emissions	Shall take reasonable achievable control measures to prevent particulate matter from becoming airborne. Reasonable achievable control measures shall include, but are not limited to, the following:	Fugitive emissions from transportation, land-disturbing, or building alteration activities located in areas identified in Appendix A to OAC 3745-17-08, except as exempted under *OAC* 3745-17-08(A)(3) — **relevant and appropriate**	*OAC* 3745-17-08(B)
	• Use, where possible, of water or chemicals for control of dust and in demolition of existing buildings or structures, construction operations, grading of roads, or the clearing of land;		*OAC* 3745-17-08(B)(1)
	• Periodic application of asphalt, oil (excluding used oil), water, or other suitable chemicals on dirt or gravel roads and parking lots, materials stock piles, and other surfaces that can create airborne dusts, or the use of canvas or other suitable coverings for all materials stockpiles and stockpiling operations except temporary stockpiles;		*OAC* 3745-17-08(B)(2) and (6)
	• Install and use hoods, fans, and other equipment to adequately enclose, contain, capture, vent, and control the fugitive dust at the point(s) of capture to the extent possible with good engineering design. Equipment must meet the efficiency requirements of *OAC* 3745-17-08(B)(3)(a) and (b);		*OAC* 3745-17-08(B)(3)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Activities causing fugitive dust (particulate) emissions (continued)	• Use of adequate containment methods during sandblasting or similar operations;		*OAC* 3745-17-08(B)(5)
	• Cover, at all times, open-bodied vehicles when transporting materials likely to become airborne;		*OAC* 3745-17-08(B)(7)
	• Pave and maintain roadways in a clean condition; and		*OAC* 3745-17-08(B)(8)
	• Promptly remove, in such a manner as to minimize or prevent resuspension, earth or other material from paved streets onto which this material has been deposited by trucking or earth moving equipment or erosion by water or other means.		*OAC* 3745-17-08(B)(9)
Airborne radionuclide emissions	Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive an EDE of 10 mrem per year.	Radionuclide air emissions to the ambient air from DOE facilities – **applicable**	40 *CFR* 61.92
	Except as provided in 458.1(4)(c), exposure to individual members of the public from radiation shall not exceed a total EDE of 0.1 rem/year (100 mrem/year), an equivalent dose to the lens of the eye exceeding 1500 mrem/year, or an equivalent dose to the skin or extremities exceeding 5,000 mrem/year, exclusive of the dose contributions from background radiation, any medical administration the individual has received, or voluntary participation in medical/research programs.	Release of radionuclides to the environment from all sources of ionizing radiation and exposure pathways at a DOE facility that could contribute significantly to the total dose —**TBC**	DOE Order 458.1(4)(b)
	Shall use, to the extent practicable, procedures and engineering controls based on sound radiation protection principles to achieve doses to members of the public that are ALARA.		DOE Order 458.1(4)(d)
	Management, storage, and disposal must be conducted in a manner such that exposure to members of the public to radiation from radioactive waste complies with ALARA process requirements and does not exceed a TED of 25 mrem in a year from all exposure pathways and radiation sources associated with the waste, except for transportation and radon and its decay products.	Management, storage, and disposal of low-level radioactive waste—**TBC**	DOE Order 458.1(h)(1)(c)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Waste generation, characterization, and segregation			
Characterization of solid waste	Must determine if solid waste is hazardous or is excluded under 40 *CFR* 261.4 [*OAC* 3745 51-04]; and	Generation of solid waste as defined in 40 *CFR* 261.2—**applicable**	40 *CFR* 262.11(a) *OAC* 3745-52-11(A)
	Must determine if waste is listed as a hazardous waste in 40 *CFR* Part 261 [*OAC* 3745-51-30 to 3745-51-35]; or	Generation of solid waste that is not excluded under 40 *CFR* 261.4—**applicable**	40 *CFR* 262.11(b) *OAC* 3745-52-11(B)
	Must determine whether the waste is identified in subpart C of 40 *CFR* 261[*OAC* 3745-51-20 through 3745-51-24], characterizing the waste by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used.	Generation of solid waste that is not listed in subpart D of 40 *CFR* 261 and not excluded under 40 *CFR* 261.4—**applicable**	40 *CFR* 262.11(c) *OAC* 3745-52-11(C)
	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chapter 40 [*OAC* 3745-51, 3745-54 to 3745-57, 3745-65 to 3745-69, 3745-205, 3745-256, 3745-266, 3745-270, and 3745-273] for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste that is determined to be hazardous—**applicable**	40 *CFR* 262.11(d) *OAC* 3745-52-11(D)
Characterization of hazardous waste	Must obtain a detailed chemical and physical analysis of a representative sample of the waste(s) that, at a minimum, contains all the information that must be known to treat, store, or dispose of the waste in accordance with 40 *CFR* 264 and 268 *OAC* 3745-54 to 3745-57, 3745-205, and 3745-270].	Generation of RCRA hazardous waste for storage, treatment or disposal—**applicable**	40 *CFR* 264.13(a)(1) and (2) *OAC* 3745-54-13(A)(1) and (2)
Determinations for land disposal of hazardous waste	Must determine if the waste meets the treatment standards in 40 *CFR* 268.40, 268.45, or 268.49 [*OAC* 3745-270-40, 3745-270-45, and 3745-270-49] by testing in accordance with prescribed methods or use of generator knowledge of waste.	Generation of RCRA hazardous waste for storage, treatment or disposal—**applicable**	40 *CFR* 268.7(a) *OAC* 3745-270-07(A)
	Treatment facilities must test their wastes according to the frequency specified in their waste analysis plans to determine if the waste meets the treatment standards in 40 *CFR* 268.40, 268.45, or 268.49 [*OAC* 3745-270-40, 3745-270-45, and 3745-270-49] prior to disposal.	Treatment of RCRA hazardous waste prior to disposal—**applicable**	40 *CFR* 268.7(b) *OAC* 3745-270-07(B)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Determinations for land disposal of hazardous waste (continued)	Must determine each EPA Hazardous Waste Number (Waste Code) to determine the applicable treatment standards under 40 *CFR* 268.40 et seq. [*OAC* 3745-270-40 et seq.].	Generation of RCRA hazardous waste for storage, treatment or disposal—**applicable**	40 *CFR* 268.9(a) *OAC* 3745-270-09(A)
	Must determine the underlying hazardous constituents [as defined in 40 *CFR* 268.2(i) and *OAC* 3745-270-02] in the waste.	Generation of RCRA characteristically hazardous waste (and is not D001 non-wastewaters treated by CMBST, RORGS, or POLYM of Sect. 268.42 Table 1) for storage, treatment or disposal—**applicable**	40 *CFR* 268.9(a) *OAC* 3745-270-09(A)
	Must determine whether the waste meets other applicable treatment standards under 40 *CFR* 268.9 [*OAC* 3745-270-09] for characteristic wastes.	Generation of RCRA characteristically hazardous waste—**applicable**	40 *CFR* 268.9(b) to (d) *OAC* 3745-270-09(B) to (C)
Characterization and management of wastewater (e.g., decon water)	On-site wastewater treatment units (including tank systems, conveyance systems, and ancillary equipment used to treat, store or convey wastewater to the wastewater treatment facility) are exempt from the requirements of RCRA Subtitle C standards.	On-site wastewater treatment units subject to regulation under Sect. 402 or Sect. 307(b) of the CWA—**applicable**	40 *CFR* 264.1(g)(6) *OAC* 3745-54-01(G)(6)
Characterization and management of industrial wastewater	Industrial wastewater discharges that are point source discharges under Sect. 402 of the CWA, as amended, are not solid wastes for purpose of hazardous waste management.	Generation of industrial wastewater for discharge—**applicable**	40 *CFR* 261.4(a)(2) *OAC* 3745-51-04(A)(2)
	No entity shall cause pollution or place or cause to be placed any sewage, sludge, sludge materials, industrial waste, or other wastes in a location where they cause pollution of any waters of the state.		*RC* 6111.04
	No person shall violate or fail to perform any duty imposed by sections 6111.01 to 6111.08 of the Revised Code or violate any order, rule, or term or condition of a permit issued or adopted by the director of environmental protection pursuant to those sections.		*RC* 6111.07
Characterization of LLW	Shall be characterized using direct or indirect methods and the characterization documented in sufficient detail to ensure safe management and compliance with the WAC of the receiving facility.	Generation of LLW for storage or disposal at a DOE facility—**TBC**	DOE M 435.1-1(IV)(I)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Characterization of LLW (continued)	Characterization data shall, at a minimum, include the following information relevant to the management of the waste:		DOE M 435.1-1(IV)(I)(2)
	• Physical and chemical characteristics;		DOE M 435.1-1(IV)(2)(a)
	• Volume, including the waste and any stabilization or absorbent media;		DOE M 435.1-1 (IV)(I)(2)(b)
	• Weight of the container and contents;		DOE M 435.1-1 (IV)(I)(2)(c)
	• Identities, activities, and concentrations of major radionuclides;		DOE M 435.1-1 (IV)(I)(2)(d)
	• Characterization date;		DOE M 435.1-1 (IV)(I)(2)(e)
	• Generating source; and		DOE M 435.1-1 (IV)(I)(2)(f)
	• Any other information that may be needed to prepare and maintain the disposal facility performance assessment, or demonstrate compliance with performance objectives.		DOE M 435.1-1 (IV)(I)(2)(g)
Packaging of solid LLW	Shall be packaged in a manner that provides containment and protection for the duration of the anticipated storage period and until disposal is achieved or until the waste has been removed from the container.	Storage of LLW in containers at a DOE facility—**TBC**	DOE M 435.1-1 (IV)(L)(1)(a)
	Vents or other measures shall be provided if the potential exists for pressurizing or generating flammable or explosive concentrations of gases within the waste container. Containers shall be marked such that their contents can be identified.		DOE M 435.1-1 (IV)(L)(1)(b) and (c)
Segregation of scrap metal for recycle	Material is not subject to RCRA requirements for generators, transporters, and storage facilities under 40 *CFR* Parts 262 through 266, 268, 270, or 124 [*OAC* 3745-50-40 to 3745-50-235 or 3745-52, 3745-53, 3745-54 to 3745-57, 3745-65 to 3745-69, 3745-205, 3745-256, 3745-266, and 3745-270].	Scrap metal, as defined in 40 *CFR* 261.1(c)(6) intended for recycle—**applicable**	40 *CFR* 261.6(a)(3)(ii) *OAC* 3745-51-06(A)(3)(b)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Management of recyclable materials for precious metal recovery	Recyclable materials being collected, transported or stored that are being reclaimed to recover economically significant amounts of gold, silver, platinum, palladium, iridium, osmium, rhodium, ruthenium, or any combination of these must be managed in accordance with the substantive requirements of *OAC* 3745-266-70.	Management of recyclable materials for precious metal recovery—**applicable**	*OAC* 3745-266-70
Management of spent lead acid batteries being reclaimed	Spent lead acid batteries being collected, transported and stored prior to regeneration must be managed in accordance with particular hazardous waste requirements depending on permit status and whether they are being reclaimed through regeneration or in other ways. Management options are detailed in 40 *CFR* 266.80 [*OAC* 3745-266-80]. Spent lead acid batteries can also be managed as universal wastes under 40 *CFR* 273 [*OAC* 3745-273].	Management of spent lead acid batteries being reclaimed—**applicable**	40 *CFR* 266.80 *OAC* 3745-266-80
Release of radiological materials or scrap metal for reuse	Before being released, property shall be monitored or surveyed to determine the types and quantities of residual radioactive material within the property; the quantities of removable and total residual radioactive material on property surfaces (including residual radioactive material on or under any coating); and that contamination within or on the property is in compliance with applicable DOE Authorized Limits of DOE Order 458.1(4)(k)(6).	Radionuclide-contaminated materials and equipment intended for unrestricted use—**TBC**	DOE Order 458.1(4)(k)(3)(b)(1)–(2) and (4)
	Where potentially contaminated surfaces are difficult to access for measurement (as in some pipes, drains, and ductwork), such property may be released after case-by-case evaluation and documentation based on both the history of its use and available measurements sufficient to demonstrate that the unsurveyable surfaces are likely to meet DOE Authorized Limits.		DOE Order 458.1(4)(k)(3)(b)(3)
Release of beryllium-contaminated equipment or other items	Must clean beryllium-contaminated equipment or other items to the lowest contamination level practicable, not to exceed the levels established in 10 *CFR* 850.31(b) and (c) and label them before release.	Release of beryllium-contaminated equipment or other items to general public or another DOE facility—**applicable**	10 *CFR* 850.31(a)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Release of beryllium-contaminated equipment or other items (continued)	Before being released to the general public or another DOE facility, ensure that the removable contamination level of equipment and item surfaces does not exceed the higher of 0.2 µg/100 cm^2 or the concentration level of beryllium in soil at the point or release, whichever is greater;		10 *CFR* 850.31(b)(1)
	Ensure equipment or item is labeled in accordance with 10 *CFR* 850.38(b); and		10 *CFR* 850.31(b)(2)
	Release is conditioned on the recipient's commitment to implement controls that will prevent foreseeable beryllium exposure.		10 *CFR* 850.31(b)(3)
	Before being released to another facility performing work with beryllium, must ensure that removal contamination level of equipment and other item surfaces does not exceed 3 µg/100 cm^2;		10 *CFR* 850.31(c)(1)
	Ensure equipment or item is labeled in accordance with 10 *CFR* 850.38(b); and		10 *CFR* 850.31(c)(2)
	Enclose or place in sealed, impermeable bags or containers to prevent the release of beryllium dust during handling or transportation.		10 *CFR* 850.31(c)(3)
Management of PCB Items	Any person removing from use a PCB item containing an intact and non-leaking PCB article must dispose of it in accordance with Sect. 761.60(b), or decontaminate it in accordance with Sect. 761.79. PCB items where the PCB articles are no longer intact and non-leaking are regulated for disposal as PCB bulk product waste under Sect. 761.62(a) or (c).	Management of PCB waste for storage or disposal—**applicable**	40 *CFR* 761.50(b)(2)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Management of ACM prior to disposal	Discharge no visible emissions to the outside air or use one of the emission control and waste treatment methods specified in paragraphs (a)(1) through (a)(4) of 40 *CFR* 61.150 [paragraphs (B)(1) through (B)(4) of *OAC* 3745-20-05].	Generation, collection, processing, packaging, and transportation of any asbestos-containing waste material that is not Category I or II nonfriable ACM waste that did not become crumbled, pulverized, or reduced to powder [40 *CFR* 61.150(a) (5)] —**applicable**	40 *CFR* 61.150(a) *OAC* 3745-20-05(B)
	All asbestos-containing waste material shall be deposited as soon as practicable at a waste disposal site operated in accordance with the provisions of 40 *CFR* 61.154 [*OAC* 3745-20-06] or an appropriate site that coverts RACM and asbestos-containing waste materials into nonasbestos (asbestos-free) materials according to the provisions of 40 *CFR* 61.155 [*OAC* 3745-20-13].		40 *CFR* 61.150(b)(1) - (2) *OAC* 3745-20-05(A)
	The requirements of 40 *CFR* 61.150(b)(1) and (2) do not apply to Category I nonfriable ACM that is not RACM.		40 *CFR* 61.150(b)(3)
Characterization and management of universal waste	A large quantity handler of universal waste is prohibited from disposing, diluting, or treating universal waste except in accordance with 40 *CFR* 273 [*OAC* 3745-273-33 or 3745-273-37].	Generation of universal waste [as defined in 40 *CFR* 273 and *OAC* 3745-273] for disposal—**applicable**	40 *CFR* 273.31 *OAC* 3745-273-31
	A large quantity handler of universal waste must manage universal waste in accordance with 40 *CFR* 273 [*OAC* 3745-273-33] in a way that prevents releases of any universal waste or component of a universal waste to the environment.		40 *CFR* 273.33 *OAC* 3745-273-33(A)
	Must label or mark the universal waste to identify the type of universal waste.		40 *CFR* 273.34 *OAC* 3745-273-34
	May accumulate waste for no longer than one year from the date the waste is generated or received from another handler unless the requirements of 40 *CFR* 273.35(b) [*OAC* 3745-273-35(B)] are met		40 *CFR* 273.35(a) *OAC* 3745-273-35(A)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Characterization and management of universal waste (continued)	May accumulate universal waste for longer than one year from the date the universal waste is generated or received from another handler if such activity is solely for the purpose of accumulation of such quantities of universal waste as necessary to facilitate proper recovery, treatment, or disposal. However, the handler bears the burden of proving that such activity was solely for this purpose.		40 *CFR* 273.35(b) *OAC* 3745-273-35(B)
	Shall ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures relative to their responsibilities during normal facility operations and emergencies.		40 *CFR* 273.36 *OAC* 3745-273-36
	A large quantity handler of universal waste must immediately contain all releases of universal wastes and other residues from universal wastes, and must determine whether any material resulting from the release is hazardous waste, and if so, must manage the hazardous waste in compliance with all applicable requirements.		40 *CFR* 273.37 *OAC* 3745- 273.37
	Must keep a record of each shipment of universal waste received and sent from the facility and retain record for at least 3 years. Record must include waste handler, shipper, or destination facility name and address, quantity and type of waste, and date shipment left or was received at facility.		40 *CFR* 273.39 *OAC* 3745-273.39
Management of universal waste batteries	A large quantity handler of universal waste must contain any universal waste battery that shows evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions in a container.	Generation of universal waste batteries [as defined in 40 *CFR* 273.9 and *OAC* 3745-273-02]—**applicable**	40 *CFR* 273.33(a)(1) *OAC* 3745-273-33(A)(1)
	Container must be closed, structurally sound, compatible with the contents of the battery, and lack evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions.		
	Batteries, or container or tank in which the batteries are contained, must be labeled or marked clearly with any one of the following phrases: "Universal Waste – Battery(ies)" or "Waste Batter(ies)" or "Used Battery(ies)."		40 *CFR* 273.34(a) *OAC* 3745-273-34(A)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Management of universal waste pesticides	A large quantity handler of universal waste pesticide must contain the pesticide in a container that remains closed, structurally sound, compatible with the pesticide, and that lacks evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions. A leaking pesticide container must be put into an overpack container, tank, or transport container, as detailed in 40 *CFR* 273.33(b) [*OAC* 3745-273-33(B)].	Generation of universal waste pesticides [as defined in 40 *CFR* 273.9 and *OAC* 3745-273-03]—**applicable**	40 *CFR* 273.33(b) *OAC* 3745-273-33(B)(1) – (4)
	A container, tank, transport vehicle or vessel in which recalled or unused pesticides are contained must be labeled or marked clearly with the label that was on or accompanied the producted and the word "Universal Waste – Pesticide(s)" or "Waste – Pesticide(s)."		40 *CFR* 273.34(b) and (c) *OAC* 3745-273-34(B) and (C)
Management of universal waste thermostats or other mercury-containing equipment	A large quantity handler of universal waste must contain any mercury-containing equipment that shows evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions in a container.	Generation of universal waste mercury-containing equipment [as defined in 40 *CFR* 273.9 and *OAC* 3745-273-04]—**applicable**	40 *CFR* 273.33(c)(1) *OAC* 3745-273-33(C)(1)
	Container must be closed, structurally sound, compatible with the contents of the thermostat, and lack evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions, and be reasonably designed to prevent the escape of mercury into the environment by volatilization or any other means.		
	May remove the mercury-containing ampule or the open original housing holding the mercury from mercury-containing equipment and manage and dispose of it in accordance with regulations.		40 *CFR* 273.33(c)(1) *OAC* 3745-273-33(C)(2)
	Mercury-containing equipment or a container in which the equipment is contained must be labeled or marked clearly with any of the following phrases: "Universal Waste – Mercury-Containing Equipment" or Waste Mercury-Containing Equipment" or "Used Mercury-Containing Equipment."		40 *CFR* 273.34(d)(1) *OAC* 3745-273-34(D)(1)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Management of universal waste thermostats or other mercury-containing equipment (continued)	Mercury-containing thermostats or containers containing only these thermostats must be labeled or marked clearly with any of the following phrases: "Universal Waste – Mercury Thermostat(s)" or "Waste Mercury Thermostat(s)" or "Used Mercury Thermostat(s)."		40 *CFR* 273.34(d)(2) *OAC* 3745-273-34(D)(2)
Management of universal waste lamps (fluorescent, mercury vapor)	A large quantity handler of universal waste must contain any lamp in containers or packages that are structurally sound, adequate to prevent breakage, and compatible with the contents of the lamps.	Generation of universal waste lamps [as defined in 40 *CFR* 273.9 and *OAC* 3745-273-05] —**applicable**	40 *CFR* 273.33(d)(1) *OAC* 3745-273-33(D)(1)
	Such containers and packages must remain closed and must lack evidence of leakage, spillage, or damage that could cause leakage of hazardous constituents under reasonably foreseeable conditions.		
	A large quantity handler of universal waste lamp must immediately clean up and place in a container any lamp that is broken and must place in a container any lamp that shows evidence of breakage, leakage, or damage that could cause the release of mercury or other hazardous constituents to the environment.		40 *CFR* 273.33(d)(2) *OAC* 3745-273-33 (D)(2)
	Each lamp or container or package in which such lamps are contained must be labeled or marked clearly with one of the following phrases: "Universal Waste-Lamp(s)," or "Waste Lamps," or "Used Lamps."		40 *CFR* 273.34(e) *OAC* 3745-273-34(E)
	Mark or label the individual item with the date the lamp(s) became a waste, or mark or label the container or package with the date the wastes were received.		40 *CFR* 273.35(c) *OAC* 3745-273-35(C)
Management of used oil	Used oil shall not be stored in a unit other than a tank, container, or RCRA regulated unit.	Generation and storage of used oil, as defined in 40 *CFR* 279.1 [*OAC* 3745-279-01(A)(12)], that meets the applicability requirements of 40 *CFR* 279.10—**applicable**	40 *CFR* 279.22(a) *OAC* 3745-279-22(A)
	Containers and aboveground tanks used to store used oil must be in good condition (no severe rusting, apparent structural defects, or deterioration) and not leaking (no visible leaks).		40 *CFR* 279.22(b)(1) and (2) *OAC* 3745-279-22(B)(1) and (2)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Management of used oil (continued)	Containers and aboveground tanks used to store used oil and fill pipes used to transfer used oil into USTs must be labeled or marked clearly with the words "Used Oil".		40 *CFR* 279.22(c)(1) and (2) *OAC* 3745-279-22 (C)(1)
	Upon detection of a release of used oil to the environment, a generator must stop the release; contain, clean up, and properly manage the released used oil; and, if necessary, repair or replace any leaking used oil storage containers or tanks prior to returning to service.	Release of used oil to the environment—**applicable**	40 *CFR* 279.22(d) *OAC* 3745-279-22(D)
Management of PCB waste	Any person storing or disposing of PCB waste must do so in accordance with 40 *CFR* 761, Subpart D.	Storage or disposal of waste containing PCBs at concentrations ≥ 50 ppm—**applicable**	40 *CFR* 761.50(a)
	Any person cleaning up and disposing of PCBs shall do so based on the concentration at which the PCBs are found.	Cleanup or disposal of PCB remediation waste as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.61
Decontamination of PCB contaminated materials prior to use, re-use, distribution, in commerce or disposal as a non-TSCA waste	Chopping (including wire chopping), distilling, filtering, oil/water separation, spraying, soaking, wiping, stripping of insulation, scraping, scarification or the use of abrasives or solvents may be used to remove or separate PCBs to the decontamination standards for liquids, concrete, or non-porous surfaces, as listed in 40 *CFR* 761.79(b).	Generation of PCB wastes, including water, organic liquids, non-porous surfaces (scrap metal from disassembled electrical equipment), concrete, and non-porous surfaces covered with porous surfaces, such as paint or coating on metal—**applicable**	40 *CFR* 761.79(b)
Decontamination of water containing PCBs to levels acceptable for discharge	For water discharged to a treatment works or to navigable waters, decontaminate to < 3 µg/L (approximately < 3 ppb) or a PCB discharge limit included in a permit issued under Sect. 304(b) or 402 of the CWA.	Discharge of water containing PCBs to a treatment works or navigable waters—**applicable**	40 *CFR* 761.79(b)(1)(ii)
Decontamination of water containing PCBs to levels acceptable for unrestricted use	Decontaminate to ≤ 0.5 µg/L (approximately ≤ 0.5 ppb) for unrestricted use.	Release of water containing PCBs for unrestricted use—**applicable**	40 *CFR* 761.79(b)(1)(iii)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Decontamination of organic liquids or non-aqueous inorganic liquids containing PCBs	For organic liquids or non-aqueous inorganic liquids containing PCBs, decontamination standard is < 2 mg/kg (i.e., < 2 ppm) PCBs.	Release of organic liquids or non-aqueous liquid containing PCBs—**applicable**	40 *CFR* 761.79(b)(2)
Decontamination of non-porous surfaces in contact with liquid PCBs to levels acceptable for unrestricted use	For non-porous surfaces previously in contact with liquid PCBs at any concentration, where no free-flowing liquids are currently present, ≤ 10 µg PCBs per 100 square centimeters (≤ 10 µg/100 cm^2) as measured by a standard wipe test (40 *CFR* 761.123) at locations selected in accordance with Subpart P of 40 *CFR* 761.	Release of non-porous surfaces in contact with liquid PCBs at any concentration for unrestricted use—**applicable**	40 *CFR* 761.79(b)(3)(i)(A)
Decontamination of non-porous surfaces in contact with non-liquid PCBs to levels acceptable for unrestricted use	For non-porous surfaces in contact with non-liquid PCBs (including non-porous surfaces covered with a porous surface, such as paint or coating on metal), clean to Visual Standard No. 2, Near-White Blast Cleaned Surface Finish of the NACE. A person shall verify compliance with standard No. 2 by visually inspecting all cleaned areas.	Release of non-porous surfaces in contact with non-liquid PCBs for unrestricted use—**applicable**	40 *CFR* 761.79(b)(3)(i)(B)
Decontamination of non-porous surfaces in contact with liquid PCBs to levels acceptable for disposal in a TSCA smelter	For non-porous surfaces previously in contact with liquid PCBs at any concentration, where no free-flowing liquids are currently present, decontaminate to < 100 µg/100 cm^2 as measured by a standard wipe test (Sect. 761.123) at locations selected in accordance with Subpart P of 40 *CFR* 761.	Disposal of non-porous surfaces previously in contact with liquid PCBs at any concentration into a smelter operating in accordance with Sect. 761.72(b) —**applicable**	40 *CFR* 761.79(b)(3)(ii)(A)
	For non-porous surfaces in contact with non-liquid PCBs (including non-porous surfaces covered with a porous surface, such as paint or coating on metal) clean to Visual Standard No. 3, Commercial Blast Cleaned Surface Finish, of the NACE. A person shall verify compliance with Standard No. 3 by visually inspecting all cleaned areas.		40 *CFR* 761.79(b)(3)(ii)(B)
Decontamination of concrete recently contaminated with PCBs	Decontamination standard for concrete is < 10 µg/100 cm^2 as measured by a standard wipe test (Sect. 761.123) if the decontamination procedure is commenced within 72 hours of the initial spill of PCBs to the concrete or portion thereof being decontaminated.	Decontamination of concrete within 72 hours of the initial spill of PCBs to the concrete—**applicable**	40 *CFR* 761.79(b)(4)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Disposal of materials previously contaminated with PCBs as non-TSCA waste	Materials from which PCBs have been removed by decontamination in accordance with 40 *CFR* 761.79, not including decontamination wastes and residuals under 40 *CFR* 761.79(g), are considered unregulated for disposal under Subpart D of TSCA (40 *CFR* 761).	Disposal of materials from which PCBs have been removed—**applicable**	40 *CFR* 761.79(a)(4)
Risk-based decontamination of PCB-containing materials	May decontaminate to an alternate risk-based decontamination standard under 40 *CFR* 761.79(h) if the standard does not pose an unreasonable risk of injury to health or the environment.	Decontamination of materials contaminated with PCBs—**applicable**	40 *CFR* 761.79(h)
Management of PCB/radioactive waste	Any person storing such waste ≥ 50 ppm PCBs must do so taking into account both its PCB concentration and radioactive properties, except as provided in 40 *CFR* 761.65(a)(1), (b)(1)(ii) and (c)(6)(i).	Generation of PCB/radioactive waste for disposal—**applicable**	40 *CFR* 761.50(b)(7)(i)
	Any person disposing of such waste must do so taking into account both its PCB concentration and its radioactive properties.		40 *CFR* 761.50(b)(7)(ii)
	If, after taking into account only the PCB properties in the waste, the waste meets the requirements for disposal in a facility permitted, licensed, or registered by a state as a municipal or non-municipal non-hazardous waste landfill, then the person may dispose of such waste without regard to the PCBs, based on its radioactive properties alone.		40 *CFR* 761.50(b)(7)(ii)
	Treatment/disposal		
Disposal of RCRA-prohibited hazardous waste in a land-based unit	May be land disposed only if it meets the applicable requirements in the table "Treatment Standards for Hazardous Waste" at 40 *CFR* 268.40 (*OAC* 3745-270-40) before land disposal. The table lists either "total waste" standards, "waste-extract" standards, or "technology-specific" standards [as detailed further in 40 *CFR* 268.42 (*OAC* 3745-270-42)].	Land disposal, as defined in 40 *CFR* 268.2, of RCRA prohibited waste [as listed in 40 *CFR* 268.20 to .39 (*OAC* 3745-270-20 to -39)]—**applicable**	40 *CFR* 268.40(a) *OAC* 3745-270-40(A) 40 *CFR* 268.20 to .40 *OAC* 3745-270-20 to -40 40 *CFR* 268.42 *OAC* 3745-270-42

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Disposal of RCRA-prohibited hazardous waste in a land-based unit (continued)	For characteristic wastes (D001 – D043) that are subject to the treatment standards, all underlying hazardous constituents must meet the UTSs specified in 40 *CFR* 268.48 (*OAC* 3745-270-48).	Land disposal of restricted RCRA characteristic wastes (D001-D043) that are not managed in a wastewater treatment unit that is regulated under the CWA, that is CWA equivalent, or that is injected into a Class I nonhazardous injection well—**applicable**	40 *CFR* 268.40(e) *OAC* 3745-270-40(E) 40 *CFR* 268.48 *OAC* 3745-270-48
	May be land disposed if the wastes no longer exhibit a characteristic at the point of land disposal, unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* 628.40 (*OAC* 3745-270-48), or are D003 reactive cyanide.	Land disposal of RCRA-restricted characteristic wastes—**applicable**	40 *CFR* 268.1(c)(4)(iv) *OAC* 3745-270-01(C)(4)
Debris	May be land disposed if treated prior to disposal as provided under the "Alternative Treatment Standards for Hazardous Debris" in 40 *CFR* 268.45(a)(1)-(5) [*OAC* 3745-270-45(A)(1)-(5)] unless it is determined under 40 *CFR* 261.3(f)(2) [*OAC* 3745-51-03(F)(2)] that the debris is no longer contaminated with hazardous waste or the debris is treated to the waste specific treatment standard provided in 40 *CFR* 268.40 (*OAC* 3745-270-40) for the waste contaminating the debris.	Land disposal, as defined in 40 *CFR* 268.2 (*OAC* 3745-270-02), of RCRA-restricted hazardous debris—**applicable**	40 *CFR* 268.45(a) *OAC* 3745-270-45(A)
	The hazardous debris must be treated for each "contaminant subject to treatment," which must be determined in accordance with 40 *CFR* 268.45(b) [*OAC* 3745-270-45(B)].		40 *CFR* 268.45(b) *OAC* 3745-270-45(B)
Soils	May be land disposed if treated prior to disposal according to the alternative treatment standards of 40 *CFR* 268.49(c) [*OAC* 3745-270-49(C)] or according to the UTSs specified in 40 *CFR* 268.48 (*OAC* 3745-270-48) applicable to the listed hazardous waste and/or applicable characteristic of hazardous waste if the soil is characteristic.	Land disposal, as defined in 40 *CFR* 268.2 (*OAC* 3745-270-02), of RCRA-restricted hazardous soils—**applicable**	40 *CFR* 268.49(b) and (c) *OAC* 3745-270-49(B) and (C)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Variance from a treatment standard for RCRA restricted hazardous wastes	A variance from a treatment standard may be used if it is: • Not physically possible to treat the waste to the level specified in the treatment standard, or by the method specified as the treatment standard; or • Inappropriate to require the waste to be treated to the level specified in the treatment standard or by the method specified as the treatment standard even though such treatment is technically possible.	Generation of a RCRA hazardous waste requiring treatment prior to land disposal—**applicable**	40 *CFR* 268.44 *OAC* 3745-270-44
Disposal of treated hazardous debris	Debris treated by one of the specified extraction or destruction technologies on Table 1 of this section and which no longer exhibits a characteristic is not a hazardous waste and need not be managed in RCRA subtitle C facility. Hazardous debris contaminated with listed waste that is treated by an immobilization technology must be managed in a RCRA subtitle C facility.	Treated debris contaminated with RCRA-listed or characteristic waste—**applicable**	40 *CFR* 268.45(c) *OAC* 3745-270-45(C)
Disposal of hazardous debris treatment residues	Except as provided in 268.45(d)(2) and (d)(4) [*OAC* 3745-270-45(D)(2) and (D)(4)], treatment residues must be separated from the treated debris using simple physical or mechanical means, and such residues are subject to the waste-specific treatment standards for the waste contaminating the debris. Layers of debris removed by spalling are hazardous debris that remain subject to treatment standards.	Residues from the treatment of hazardous debris—**applicable**	40 *CFR* 268.45(d)(1) – (5) *OAC* 3745-270-45(D)(1) – (5)
Prohibition of dilution to meet LDRs	Except as provided under 40 *CFR* 268.3(b) [*OAC* 3745-270-03(B)], must not in any way dilute a restricted waste or the residual from treatment of a restricted waste as a substitute for adequate treatment to achieve compliance with land disposal restriction levels.	Land disposal, as defined in 40 *CFR* 268.2 (*OAC* 3745-270-02), of RCRA-restricted hazardous soils—**applicabl**e	40 *CFR* 268.3(a) *OAC* 3745-270-03(A)
Pretreatment standards for discharges to a permitted wastewater treatment unit	Pollutants introduced to POTWs shall not pass through POTWs or interfere with the operation or performance of the POTW. Substances listed in *OAC* 3745-3-04(B) shall not be introduced into a POTW.	Discharge of wastewater containing pollutants to a POTW—**relevant and appropriate**	*OAC* 3745-3-04

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Pretreatment standards for discharges to a permitted wastewater treatment unit (continued)	Must notify POTW immediately of all discharges that could cause problems to the POTW, including any slug loading, in accordance with *OAC* 3745-3-05.		*OAC* 3745-3-05
	Industrial users are subject to national categorical pretreatment standards under 40 *CFR* 403.6 and to the general requirements listed in *OAC* 3745-3-09 regarding the interpretation and application of pretreatment standards.		*OAC* 3745-3-09
Disposal of wastewaters containing RCRA hazardous constituents in a CWA wastewater treatment unit	Disposal is not prohibited if the wastes are managed in a treatment system which subsequently discharges to waters of the U.S. under the CWA unless the wastes are subject to a specified method of treatment other than DEACT in 40 *CFR* 268.40 (*OAC* 3745-270-40) or are D003 reactive cyanide.	Disposal of RCRA restricted hazardous wastes that are hazardous only because they exhibit a hazardous characteristic and are not otherwise prohibited under 40 *CFR* Part 268—**applicable**	40 *CFR* 268.1(c)(4)(i) *OAC* 3745-270-01(C)(4)
Disposal of wastewaters in a CWA wastewater treatment unit	No entity shall cause pollution or place or cause to be placed any sewage, sludge, sludge materials, industrial waste, or other wastes in a location where they cause pollution of any waters of the state.	Discharge of contaminants to waters of the state —**applicable**	*RC* 6111.04
	No person shall violate or fail to perform any duty imposed by sections 6111.01 to 6111.08 to the Revised Code or violate any order, rule, or term or condition of a permit issued or adopted by the director of environmental protection pursuant to those sections.		*RC* 6111.07
Treatment and disposal of ignitable, reactive, or incompatible RCRA wastes	Must take precautions to prevent accidental ignition or reaction of waste, and waste must be separated and protected from sources of ignition or reaction.	Operation of a RCRA facility that treats or stores ignitable, reactive, or incompatible wastes—**applicable**	40 *CFR* 264.17(a) *OAC* 3745-54-17(A)
	Must take precautions to prevent reactions that: • Generate extreme heat, pressure, fire or explosion, or violent reactions. • Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment.		40 *CFR* 264.17(b) *OAC* 3745-54-17(B)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Treatment and disposal of ignitable, reactive, or incompatible RCRA wastes (continued)	• Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions. • Damage the structural integrity of the device or facility. • Through other like means threaten human health or the environment.		
Disposal of solid wastes	Except as provided in paragraph (D) of *OAC* 3745-27-02, no person shall establish or modify a solid waste disposal facility without meeting the substantive criteria as follows:	Management and disposal of solid waste**—applicable**	*OAC* 3745-27-02(A)
	Disposal of solid wastes shall only be by the following methods or combination thereof:		*OAC* 3745-27-05(A)
	• Disposal at a licensed sanitary landfill facility		*OAC* 3745-27-05(A)(1)
	• Incinerating at a licensed incinerator		*OAC* 3745-27-05(A)(2)
	• Composting at a licensed composting facility		*OAC* 3745-27-05(A)(3)
	• Alternative disposal methods either as engineered fill or land application, provided use will not create a nuisance or harm human health or the environment and is capable of complying with other applicable laws.		*OAC* 3745-27-05(A)(4)
Prohibition on open dumping of solid wastes	Temporary storage of putrescible solid wastes in excess of seven days, or temporary storage of any solid wastes where such storage causes a nuisance or health hazard shall be considered open dumping.	Temporary storage of solid waste prior to collection for disposal or transfer—**applicable**	*OAC* 3745-27-03(A)(2)
	No person shall conduct, permit, or allow open dumping. In the event that open dumping is or has occurred, person(s) responsible shall promptly remove and dispose or otherwise manage the solid waste and shall submit verification that the waste has been properly managed.	Management and disposal of solid waste**—applicable**	*OAC* 3745-27-05(C)
Treatment of LLW	Waste treatment to provide more stable waste forms and to improve the long-term performance of a LLW disposal facility shall be implemented as necessary to meet performance objectives of the disposal facility.	Generation of LLW for disposal at a DOE LLW disposal facility—**TBC**	DOE M 435.1-1(IV)(O)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Disposal of solid LLW at DOE facilities	Shall meet waste acceptance requirements before it is transferred to the receiving facility.	Generation of LLW for disposal at a DOE facility—**TBC**	DOE M 435.1-1(IV)(J)(2)
Disposal of refrigeration equipment	With the exception of the substitutes in the end uses listed in 40 *CFR* 82.154(a)(1)(i) – (vi), no person maintaining, servicing, repairing, or disposing of appliances may knowingly vent or otherwise release into the environment any refrigerant or substitute from such appliances.	Appliances that contain Class I or II substances used as a refrigerant—**applicable**	40 *CFR* 82.154(a)(1)
	De minimis releases associated with good faith attempts to recycle or recover refrigerants are not subject to this prohibition.		40 *CFR* 82.154(a)(2)
	No person may dispose of such appliances, except for small appliances, MVACs, and MVAC-like appliances, without: • Observing the required practices set forth in 40 *CFR* 82.156, and • Using equipment that is certified for that type of appliance pursuant to 40 *CFR* 82.158.		40 *CFR* 82.154(b)
Disposal of asbestos-containing waste material (e.g., transite siding, pipe lagging, insulation, ceiling tiles)	All asbestos-containing waste material must be deposited as soon as practicable at a waste disposal site operated in accordance with Section 61.154 [*OAC* 3745-20-06] or a site that converts RACM and asbestos-containing waste material into nonasbestos (asbestos free) material according to the provisions of 40 *CFR* 61.155 [*OAC* 3745-20-13].	Removal and disposal of RACM except Category I nonfriable asbestos containing material—**applicable**	40 *CFR* 61.150(b)(1) and (2) *OAC* 3745-20-05(A)
	May use an alternative emission control and waste treatment method that will control asbestos emissions equivalent to currently required methods, the alternative method is suitable for the intended application, and the alternative method will not violate other regulations and will not result in increased water or land pollution or occupational hazards.		40 *CFR* 61.150(a)(4) *OAC* 3745-20-05(B)(4)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Exclusions for disposal or reuse of construction and demolition debris, or "clean hard fill" [as defined in *OAC* 3745-400-01(E)]	Construction and demolition debris facility requirements do not apply to construction and demolition debris or clean hard fill used in one or more of the following ways: • Any construction site where construction debris and trees and brush removed in clearing the construction site are used as fill material on the site where the materials are generated or removed; • Any site where clean hard fill is used, either alone or in conjunction with clean soil, sand, gravel, or other clean aggregates, in legitimate fill operations; • Any site where debris is not disposed, such as where debris is reused or recycled in a beneficial manner, or stored for a temporary period remaining unchanged and retrievable.	Use of construction and demolition debris or clean hard fill at a site—**applicable**	*OAC* 3745-400-03
Disposal of construction and demolition debris	Shall be disposed of only in an authorized construction and demolition debris facility or solid waste disposal facility; by means of open burning if permitted as provided in *OAC* 3745-19; or by other methods provided such methods are demonstrated to be capable of disposing without creating a nuisance or health hazard, without causing water pollution, and without violating any regulations under Chapters 3745, 3704 or 3734.	Disposal of construction and demolition debris—**applicable**	*OAC* 3745-400-04(A) and (B)
Disposal of construction and demolition debris as "clean hard fill"	Clean hard fill consisting of reinforced or nonreinforced concrete, asphalt concrete, brick (includes but is not limited to refractory brick and mortar), block, tile, or stone shall be managed in one or more of the following ways: • Recycled into usable construction material; • Disposed in construction and demolition debris or other waste facilities; • Used in legitimate fill operations for construction purposes or to bring the site up to consistent grade, on the site of generation, or on a site other than the site of generation, pursuant to paragraph (C) of *OAC* 3745-400-05.	Use of clean hard fill (does not include materials contaminated with hazardous, solid, or infectious waste) to bring a construction site up to consistent grade—**applicable**	*OAC* 3745-400-05(A)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Disposal of construction and demolition debris as "clean hard fill" (continued)	Clean hard fill may be stored for a period of less than two years. "Stored" means held in a manner remaining retrievable and substantially unchanged. Clean hard fill piled adjacent to a construction materials processing facility shall not be considered stored for more than 2 years if the pile is active, i.e., if clean hard fill material is added to and removed from the pile within a 2 year period.		*OAC* 3745-400-05(B)
Performance-based disposal of PCB remediation waste	Shall be disposed according to 40 *CFR* 761.60(a) or (e), or decontaminated in accordance with 40 *CFR* 761.79.	Disposal of liquid PCB remediation waste—**applicable**	40 *CFR* 761.61(b)(1)
	May dispose by one of the following methods:	Disposal of nonliquid PCB remediation waste (as defined in 40 *CFR* 761.3) —**applicable**	40 *CFR* 761.61(b)(2)
	• In a high-temperature incinerator under 40 *CFR* 761.70(b); • By an alternate disposal method under 40 *CFR* 761.60(e); • In a chemical waste landfill under 40 *CFR* 761.75; • In a facility under 40 *CFR* 761.77; or		40 *CFR* 761.61(b)(2)(i)
	• Through decontamination in accordance with 40 *CFR* 761.79.		40 *CFR* 761.61(b)(2)(ii)
Risk-based disposal of PCB remediation waste	May dispose of in a manner other than prescribed in 40 *CFR* 761.61(a) or (b) if the method will not pose an unreasonable risk of injury to health or the environment.	Disposal of PCB remediation waste—**applicable**	40 *CFR* 761.61(c)
Disposal of PCB decontamination waste and residues	Shall be disposed of at their existing PCB concentration unless otherwise specified in 40 *CFR* 761.79(g).	PCB decontamination waste and residues for disposal—**applicable**	40 *CFR* 761.79(g)
Disposal of PCB liquids (e.g., from drained electrical equipment)	Must be disposed of in an incinerator that complies with 40 *CFR* 761.70, except:	PCB liquids at concentrations $\geq$ 50 ppm—**applicable**	40 *CFR* 761.60(a)
	For mineral oil dielectric fluid, may be disposed in a high efficiency boiler according to 40 *CFR* 761.71(a).		40 *CFR* 761.60(a)(1)
	For liquids other than mineral oil dielectric fluid, may be disposed in a high efficiency boiler according to 40 *CFR* 761.71(b).		40 *CFR* 761.60(a)(2)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Disposal of PCB-contaminated precipitation, condensation, or leachate	May be disposed in a chemical waste landfill that complies with 40 *CFR* 761.75 if: • Disposal does not violate 40 *CFR* 268.32(a) or 268.42(a)(1), and • Liquids do not exceed 500 ppm and are not ignitable waste as described in 40 *CFR* 761.75(b)(8)(iii).	PCB liquids at concentrations ≥ 50 ppm from incidental sources and associated with PCB articles or non-liquid PCB wastes—**applicable**	40 *CFR* 761.60(a)(3) 40 *CFR* 761.60(a)(3)(i) 40 *CFR* 761.60(a) (3)(ii)
Disposal of PCB transformers	Shall be disposed of in either: • An incinerator that complies with 40 *CFR* 761.70, or • A chemical waste landfill that is compliant with 40 *CFR* 761.75 provided all free flowing liquid is removed from the transformer, the transformer is filled with a solvent, the transformer is allowed to stand for at least 18 continuous hours, and then the solvent is thoroughly removed.	PCB-contaminated electrical equipment (including transformers that contain PCBs at concentrations of ≥ 50 ppm and < 500 ppm in the contaminating fluid) as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.60(b)(1) 40 *CFR* 761.60(b)(1) (i)(A) 40 *CFR* 761.60(b)(1) (i)(B)
Performance-based disposal of PCB bulk product waste	May dispose of by one of the following: • In an incinerator under Sect. 761.70, • In a chemical waste landfill under Sect. 761.75, • In a hazardous waste landfill under Sect. 3004 or /Sect. 3006 of RCRA, • Under alternate disposal under Sect. 761.60(e), • In accordance with decontamination provisions of Sect. 761.79; • In accordance with the thermal decontamination provisions of Sect. 761.79(e)(6) for metal surfaces in contact with PCBs.	Disposal of PCB bulk product waste as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.62(a) 40 *CFR* 761.62(a)(1) 40 *CFR* 761.62(a)(2) 40 *CFR* 761.62(a)(3) 40 *CFR* 761.62(a)(4) 40 *CFR* 761.62(a)(5) 40 *CFR* 761.62(a)(6)
Risk-based disposal of PCB bulk product waste	May dispose of in a manner other than that prescribed in 40 *CFR* 761.62(a) if the method will not pose an unreasonable risk of injury to health or the environment.	Disposal of PCB bulk product waste as defined in 40 *CFR* 761.3—**applicable**	40 *CFR* 761.62(c)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Disposal of PCB bulk product waste in solid waste landfill	May dispose of the following in a municipal or non-municipal non-hazardous waste landfill.	Disposal of non-liquid PCB bulk product waste listed in 40 *CFR* 761.62(b)(1)—**applicable**	40 *CFR* 761.62(b)(1)
	• Plastics (such as plastic insulation from wire or cable; radio, television and computer casings; vehicle parts; or furniture laminates); preformed or molded rubber parts and components; applied dried paints, varnishes, waxes or other similar coatings or sealants; caulking; Galbestos; non-liquid building demolition debris; or non-liquid PCB bulk product waste from the shredding of automobiles or household appliances from which PCB small capacitors have been removed (shredder fluff)		40 *CFR* 761.62(b)(1)(i)
	• Other PCB bulk product waste, sampled in accordance with the protocols set out in subpart R of 40 *CFR* Part 761, that leaches PCBs at < 10 μg/L of water measured using a procedure used to simulate leachate generation		40 *CFR* 761.62(b)(1)(ii)
	May dispose of in a municipal or non-municipal nonhazardous waste landfill if:	PCB bulk product waste not meeting conditions of 40 *CFR* 761.62(b)(1) (e.g., paper/felt gaskets contaminated by liquid PCBs)—**applicable**	40 *CFR* 761.62(b)(2)
	• The PCB bulk product waste is segregated from organic liquids disposed of in the landfill, and		40 *CFR* 761.62(b)(2)(i)
	• Leachate is collected from the landfill and monitored for PCBs.		40 *CFR* 761.62(b)(2)(ii)
Disposal of fluorescent light ballasts	Must be disposed of in a TSCA disposal facility as bulk product waste under 40 *CFR* 761.62 or in accordance with the decontamination provisions of 40 *CFR* 761.79.	Generation for disposal of fluorescent light ballasts containing PCBs in the potting material—**applicable**	40 *CFR* 761.60(b)(6)(iii)
Disposal of PCB-contaminated electrical equipment (except capacitors)	Must remove all free-flowing liquid from the electrical equipment and dispose of the removed liquid in accordance with 40 *CFR* 761.60(a) and	Generation of PCB-contaminated electrical equipment (as defined in 40 *CFR* 761.3) for disposal —**applicable**	40 *CFR* 761.60(b)(4)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Disposal of PCB-contaminated electrical equipment (except capacitors) (continued)	Dispose of by one of the following methods: • In a facility managed as a municipal solid waste or non-municipal non-hazardous waste; • In an industrial furnace operating in compliance with 40 *CFR* 761.72; or • In a disposal facility under 40 *CFR* 761.60.	Drained PCB-contaminated electrical equipment, including any residual liquids—**applicable**	40 *CFR* 761.60(b)(4)(i)
Disposal of PCB capacitors	Any person must assume that a capacitor manufactured prior to July 2, 1979, whose PCB concentration is not established, contains ≥ 500 ppm PCBs. If the date of manufacture is unknown, any person must assume the capacitor contains ≥ 500 ppm PCBs.	Generation of PCB capacitors with ≥ 500 ppm PCBs for disposal—**applicable**	40 *CFR* 761.2(a)(4)
	Shall comply with all requirements of 40 *CFR* 761.60 unless it is known from label or nameplate information, manufacturer's literature, or chemical analysis that capacitor does not contain PCBs.		40 *CFR* 761.60(b)(2)(i)
	Shall dispose of in accordance with either of the following: • disposal in an incinerator that complies with 40 *CFR* 761.70; or • disposal in a chemical waste landfill that complies with 40 *CFR* 761.75.	Generation of PCB capacitors with ≥ 500 ppm PCBs for disposal—**applicable**	40 *CFR* 761.60(b)(2)(iii)
	Shall dispose of in one of the following disposal facilities approved under 40 *CFR* 761.60: • incinerator under 40 *CFR* 761.70; • chemical waste landfill under 40 *CFR* 761.75; • high efficiency boiler under 40 *CFR* 761.71; or • scrap metal recovery oven or smelter under 40 *CFR* 761.72.	Disposal of large capacitors that contain ≥ 50 ppm but < 500 ppm PCBs **—applicable**	40 *CFR* 761.60(b)(4)(ii)
	May dispose of in municipal solid waste landfill.	Generation of PCB small capacitors (as defined in 40 *CFR* 761.3) for disposal—**applicable**	40 *CFR* 761.60(b)(2)(ii)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Disposal of PCB-contaminated articles	Must remove all free-flowing liquid from the article, disposing of the liquid in compliance with the requirements of 40 *CFR* 761.60(a)(2) or (a)(3), and	Generation of PCB-contaminated articles (as defined in 40 *CFR* 761.3) for disposal—**applicable**	40 *CFR* 761.60(b)(6)(ii)
	Dispose by one of the following methods: • In accordance with the decontamination provisions at 40 *CFR* 761.79; • In a facility managed as a municipal solid waste or non-municipal nonhazardous waste; • In an industrial furnace operating in compliance with 40 *CFR* 761.72; or • In a disposal facility under 40 *CFR* 761.60.	Disposal of PCB-contaminated articles with no free-flowing liquid—**applicable**	40 *CFR* 761.60(b)(6)(ii)(A) thru (D)
	Transportation[b]		
Transportation of hazardous waste on site	The generator manifesting requirements of 40 *CFR* 262.20 to 262.32(b) [*OAC* 3745-52-20 to 3745-52-23 and 3745-52-32(B)] do not apply. Generator or transporter must comply with the requirements set forth in 40 *CFR* 263.30 and 263.31 [*OAC* 3745-53-30 and 3745-53-31] in the event of a discharge of hazardous waste on a private or public right-of-way.	Transportation of hazardous wastes on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way—**applicable**	40 *CFR* 262.20(f) *OAC* 3745-52-20(F)
Transportation of hazardous materials on site	Must meet the substantive requirements of 49 *CFR* Parts 171-174, 177, and 178 or the site or facility specific Transportation Safety Document [i.e., *Transportation Safety Document for the On-Site Transfer of Hazardous Material at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* LPP-0021/R3].	Transport of hazardous materials on the Portsmouth site – **TBC**	DOE Order 460.1C(4)(b)
Transportation of radioactive waste	Shall be packaged and transported in accordance with the substantive requirements of DOE Order 460.1C (*Packaging and Transportation Safety*) and DOE Order 460.2A (*Departmental Materials Transportation and Packaging Management*).	Preparation of shipment of radioactive waste—**TBC**	DOE M 435.1-1 (I)(1)(E)(11)
	To the extent practicable, the volume of waste and number of shipments shall be minimized.		DOE M 435.1-1 (III)(L)(2) DOE M 435.1-1 (IV)(L)(2)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Transportation of PCB wastes off site	Must comply with the manifesting provisions at 40 *CFR* 761.207 through 218.	Preparation for relinquishment of control over PCB wastes by transporting or offering for transport—**applicable**	40 *CFR* 761.207(a)
Transportation of hazardous waste off site	Must comply with the generator requirements of 40 *CFR* 262.20 to 262.23 [*OAC* 3745-52-20 to 3745-52-23] for manifesting, Sect. 262.30 [*OAC* 3745-52-30] for packaging, Sect. 262.31 [*OAC* 3745-52-31] for labeling, Sect. 262.32 [*OAC* 3745-52-32] for marking, Sect. 262.33 [*OAC* 3745-52-33] for placarding, Sects. 262.40 and 262.41(a) [*OAC* 3745-52-40 and 3745-52-41] for record keeping requirements, and Sect. 262.12 [*OAC* 3745-52-12] to obtain EPA ID number.	Preparation of RCRA hazardous waste for transport off site—**applicable**	40 *CFR* 262.10(h) *OAC* 3745-52-10(H) 40 *CFR* 262.20 to .23 *OAC* 3745-52-20 to -23 40 *CFR* 262.30 to .33 *OAC* 3745-52-30 to -33
Transportation of universal waste off site	Off-site shipments of universal waste by a large quantity handler of universal waste shall be made in accordance with 40 *CFR* 273.38 [*OAC* 3745-273-38].	Preparation of universal waste for transport off site—**applicable**	40 *CFR* 273.38(c) *OAC* 3745-273-38(C)
	Off-site shipments to a foreign destination must comply with requirements applicable to a primary exporter in *OAC* 3745-52-10, 3745-52-53, 3745-52-56 and 3745-52-57 and export waste only upon consent of the receiving country and in conformance with the EPA "Acknowledgement of Consent" as defined in OAC 3745-52-50 to 3745-52-57. A copy of the consent must be provided to the transporter.		40 *CFR* 273.40 *OAC* 3745-273.40
Transportation of used oil off site	Except as provided in paragraphs (a) to (c) of 40 *CFR* 279.24 [*OAC* 3745-279-24(A) to (C)], generators must ensure that their used oil is transported by transporters who have obtained EPA ID numbers.	Preparation of used oil for transport off site—**applicable**	40 *CFR* 279.24 *OAC* 3745-279-24
Transportation of asbestos-containing waste materials off site	For asbestos-containing waste material to be transported off the facility site, label containers or wrapped materials with the name of the waste generator and location at which the waste was generated.	Preparation for transport of asbestos-containing waste materials off site—**applicable**	40 *CFR* 61.150(a)(1)(v) *OAC* 3745-20-05(C)(1)
	Mark vehicles used to transport asbestos-containing waste material during the loading and unloading of waste so that the signs are visible. The markings must conform to the requirements of 40 *CFR* 61.149(d)(1)(i), (ii), and (iii).		40 *CFR* 61.150(c) *OAC* 3745-20-05(E)

Table B.2. ARARs and TBC guidance for Sitewide Waste Disposition Evaluation Project Off-site Disposal Alternative at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio (Continued)

Action	Requirements[a]	Prerequisite	Citation
Transportation of hazardous materials off site	Any person who, under contract with a department or agency of the Federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material, shall be subject to and must comply with all applicable provisions of the HMTA and HMR at 49 *CFR* 171 – 180 related to marking, labeling, placarding, etc.	Preparation for transport or shipment "in commerce" of a hazardous material—**applicable**	49 *CFR* 171.1(c)

[a]The requirements portion of the ARARs table is intended to provide a summary of the cited ARAR. The omission of any particular requirement does not limit the scope of the cited ARARs.
[b]Off-site transportation, by definition, is not an on-site response action and is subject to all substantive, procedural, and administrative requirements of all legally applicable laws but not to any requirements that might be relevant and appropriate under the ARARs process.

ACM = asbestos-containing material
ALARA = as low as reasonably achievable
ARAR = applicable or relevant and appropriate requirement
CFR = Code of Federal Regulations
CMBST = combustion
CWA = Clean Water Act
DEACT = deactivation
DOE = U.S. Department of Energy
DOE M = U.S. Department of Energy Radioactive Waste Management Manual
DOT = U.S. Department of Transportation
EDE = effective dose equivalent
EPA = U.S. Environmental Protection Agency
HMR = Hazardous Materials Regulations
HMTA = Hazardous Materials Transportation Act of 1975 (Amendments of 1976)
ID = identification number
LDRs = land disposal restrictions
LPP = LATA/Parallax Portsmouth, LLC
LLW = low-level (radioactive) waste
MVAC = motor vehicle air conditioning
NACE = National Association of Corrosion Engineers
OAC = Ohio Administrative Code
PCB = polychlorinated biphenyl
POLYM = polymerization
POTW = publicly owned treatment works
RACM = regulated asbestos-containing material
RC = Ohio Revised Code
RCRA = Resource Conservation and Recovery Act of 1976
RORGS = recovery of organics
TBC = to be considered
TED = total effective dose
TSCA = Toxic Substances Control Act of 1976
USC = *United States Code*
UST = underground storage tank
UTS = universal treatment standard
WAC = waste acceptance criteria

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APPENDIX C: PRELIMINARY WASTE ACCEPTANCE CRITERIA

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ACRONYMS

ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate
ASA	auditable-safety analysis
CFR	*Code of Federal Regulations*
CSM	conceptual site model
D&D	decontamination and decommissioning
DFF&O	*Director's Final Findings and Orders – Modification of April 13, 2010, Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project)*
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
ELCR	excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
FS	feasibility study
HDPE	high-density polyethylene
HELP	Hydrologic Evaluation of Landfill Performance
HI	hazard index
LLW	low-level (radioactive) waste
LPP	LATA Parallax Portsmouth LLC
Ohio EPA	Ohio Environmental Protection Agency
OSDC	on-site disposal cell
NRC	U.S. Nuclear Regulatory Commission
PER	Pre-investigation Evaluation Report
POA	point of assessment
POC	point of compliance
PORTS	Portsmouth Gaseous Diffusion Plant
RCRA	Resource Conservation and Recovery Act of 1976
RI	remedial investigation
ROD	Record of Decision
SOF	sum of fraction
SRC	site-related contaminant
TBC	to be considered
TSCA	Toxic Substances Control Act of 1976
UCL95	95th percentile upper confidence limit
USGS	U.S. Geological Survey
WAC	waste acceptance criteria

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C.1 INTRODUCTION AND BACKGROUND INFORMATION

C.1.1 INTRODUCTION

Decontamination and decommissioning (D&D) and waste disposition planning activities at the U.S. Department of Energy (DOE) Portsmouth Gaseous Diffusion Plant (PORTS) include the evaluation of on-site waste disposal within an engineered on-site disposal cell (OSDC) designed, constructed, operated, and closed to safely dispose of waste that would meet waste acceptance criteria (WAC) developed for such an OSDC and approved by Ohio EPA. Waste that did not meet the WAC of such an OSDC would either be treated to meet the WAC or be disposed off site at a DOE-approved waste disposal facility. This appendix provides preliminary WAC under consideration for a potential OSDC. A potential OSDC would accept only PORTS-generated wastes (including any potential wastes found off site related to past PORTS operations) as set forth in a Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Record of Decision (ROD). The ROD would contain the final analytic WAC and other elements of a WAC (e.g., administrative WAC), however, development of complete WAC requires completion of OSDC design specifications and operational plans.

WAC, as defined in the *Director's Final Findings and Orders – Modification of April 13, 2010, Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action for the Portsmouth Gaseous Diffusion Plant (Decontamination and Decommissioning Project)* (DFF&O) (Ohio Environmental Protection Agency [EPA] 2011), specify standards for waste evaluation and characterization, waste physical characteristics, waste packaging, waste safe handling, waste transportation, and activity criteria and chemical concentration criteria (i.e., radioisotope and chemical analytic WAC).

These preliminary WAC are principally focused on the development of radioisotope and chemical analytic WAC as required by the DFF&O and provide an early review and understanding of important WAC features. These preliminary analytic WAC for the potential OSDC were developed utilizing industry-accepted conceptual design and modeling approaches, including the PATHRAE HAZ/RAD analytic model. While this model has limitations with respect to simulating complex hydrogeologic systems, its use is specific only to the purpose described herein. Resulting preliminary analytic WAC are provided in this Remedial Investigation/Feasibility Study (RI/FS) Work Plan to support an initial evaluation as to the possible viability for disposing waste in an on-site facility and screening potential locations for the OSDC on the PORTS DOE property. Comments received from Ohio EPA on the preliminary WAC are to be addressed in future WAC development as more site-specific and alternative-specific information becomes available.

Final analytic WAC for an OSDC will be developed through the course of the Sitewide Waste Disposition Evaluation project. Final analytic WAC values will be determined using refined modeling tools, parameters, and assumptions, as discussed and agreed to with the Ohio Environmental Protection Agency (Ohio EPA), and documented in the ROD if on-site disposal is the selected remedial action alternative. Other facets of WAC defined in the DFF&O are described generally herein but will be developed in detail as OSDC logistics, design, and operational planning matures. This will include defining the appropriate standards for waste characterization to demonstrate compliance with the OSDC analytic WAC as described in a WAC Attainment Plan to be prepared if the on-site waste disposition alternative is selected.

Ohio EPA and the public will provide input to the development of a WAC through a series of workshops. Currently, this appendix focuses on quantitative preliminary WAC for radionuclide activity concentration

criteria and chemical mass concentration criteria, referred to herein as “analytic WAC” for the study areas examined in this work plan.

C.1.2 PURPOSE

The purpose of preliminary WAC is to establish a basis for evaluating the alternatives set forth in the PORTS Sitewide Waste Disposition Evaluation Project RI/FS. The three alternatives for management of future-generated PORTS D&D waste being evaluated are the following:

1. No action
2. On-site disposal
3. Off-site disposal

Specifically, the preliminary analytic WAC are established for the following reasons:

- Determine the key site-related contaminants (SRCs) for the on-site versus off-site disposal decisions
- Evaluate the relative protectiveness of the potential OSDC sites
- Determine a lower-range estimate of D&D waste volume that may be disposed on site
- Assess the cost effectiveness of on-site versus off-site alternatives based on the lower-range volume estimate
- Evaluate the sensitivity of analytic WAC to the modeling input parameters
- Direct future field investigations to collect critical site-specific data for use in final analytic WAC development.

C.1.3 ON-SITE DISPOSAL BACKGROUND

Disposed wastes would contain low-level (radioactive) waste (LLW) regulated by the Atomic Energy Act of 1954, appropriately treated Resource Conservation and Recovery Act of 1976 (RCRA) hazardous waste, Toxic Substances Control Act of 1976 (TSCA) toxic constituents, and combinations of these contaminants. The volume of D&D waste is currently estimated at 1.6 million cy. The current estimate for the volume of contaminated environmental media waste is 600,000 cy based on process knowledge, past studies, and engineering judgment. Therefore, the total estimated volume of waste requiring disposal is 2.2 million cy. For early planning and evaluation purposes, the OSDC will be conceptualized to manage a waste volume of 3 million cy, which would require an OSDC footprint between 25 and 100 acres, depending on design parameters such as location, height of the OSDC, side slope design, etc. An OSDC would be constructed in a modular fashion such that delivery of waste disposal capacity stays ahead of waste disposal demand, and the OSDC will only be as large as required to complete the cleanup of the PORTS site. It is anticipated that the operational period of a potential OSDC would be nominally 20 years. Additionally, following closure DOE would perform post-closure care and monitoring for a minimum of 30 years following final closure, as required by RCRA hazardous waste applicable or relevant and appropriate requirements (ARARs).

The following two waste volumes have been considered for each study area for development of the preliminary WAC:

- Low-end volume of 1,000,000 cy
- High-end volume 3,000,000 cy.

The 1-million and 3-million-cy volume estimates are not meant to be bounding values for the actual volumes to be generated in the future. Rather, the above volume estimates are reasonable point estimates to assess the effectiveness and protectiveness of an on-site disposal alternative and provide the anticipated footprint for the three study areas for preliminary analytic WAC development. During the development of final analytic WAC, sensitivity analyses may be performed assuming a wider range of waste volumes to understand relative impacts to calculated analytic WAC limits.

C.2 POTENTIAL CANDIDATE OSDC LOCATIONS

Based on the results of the initial screening analysis discussed in the Pre-investigation Evaluation Report (PER) [DOE 2010] for the Sitewide Waste Disposition Evaluation Project, preliminary analytic WAC were developed for three of the four candidate study areas (Study Areas A, B, and C) only (see Figure C.1). Because Study Area D is located on top of the same geologic formation as Study Area C, preliminary analytic WAC for Site D would be approximated by the preliminary analytic WAC developed for Site D. As shown in Figure C.1, Study Area A overlies Perimeter Road near the southeast corner of the DOE property at PORTS on a relatively flat terrain, Study Area B straddles Perimeter Road in the north central portion of the DOE property in the industrial area, Study Area C is on the hillside on the far eastern boundary of the PORTS site, and Study Area D is in the northeast portion of the PORTS site.

A general cross section of the geology and hydrogeology of the PORTS site and the relative positions of the three study areas are shown in Figure C.2. Study Area B is within the Minford clays and Gallia groundwater system. Study Area A also is within the Gallia groundwater system, but nearly half of its area (i.e., length wise) is within the Cuyahoga Shale formation. Study Areas C and D are completely within the Cuyahoga Shale formation, and the depth to groundwater is potentially greater than 50 ft below the surface across both study areas. Vertical movement of contamination through shale is very slow, as discussed in the analytic WAC modeling results.

In development of preliminary analytic WAC, the PORTS-specific sitewide groundwater model was used as the principal basis for development. PORTS-specific parameters (e.g., hydraulic conductivity, distribution coefficient [K_d] values, etc.) necessary to develop analytic WAC were used in the models. Absent site-specific values, model default values or literature values, in many cases previously used at PORTS, were used for preliminary analytic WAC development. Information from the field studies discussed in this RI/FS Work Plan will provide more site-specific values for the final analytic WAC.

C.3 PRELIMINARY ANALYTIC WAC DEVELOPMENT

C.3.1 BACKGROUND

This section describes the analytical methods and associated models used to develop the preliminary analytic WAC for an OSDC with the design elements previously described. Analytic WAC are risk-based limits for constituents that might be placed in an OSDC. These limits are to be protective of long-term human health and the environment. For the preliminary analytic WAC modeling, the list of SRCs was determined from process knowledge and from results presented in the Integrator Point

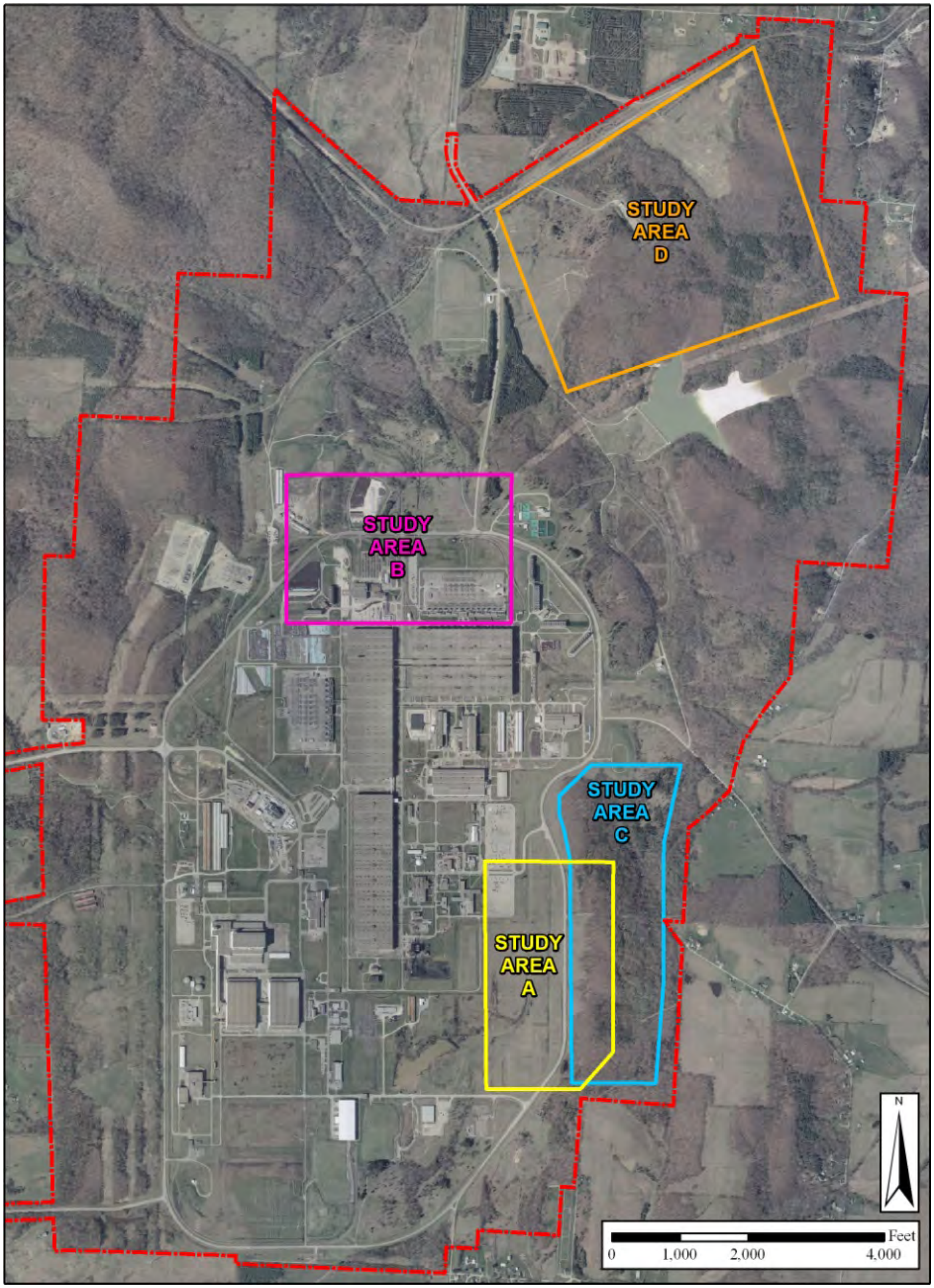

Figure C.1. Potential Waste Disposal Sites (Study Areas A, B C, and D) at PORTS

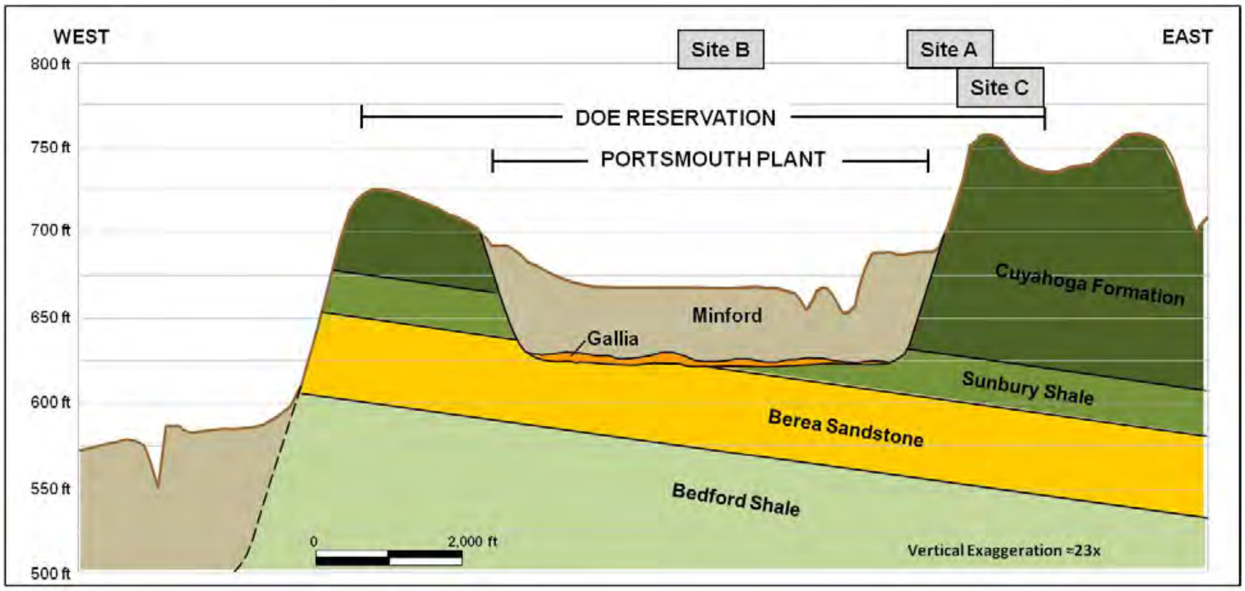

Figure C.2. Geological Cross Section of the PORTS Site

Assessment (DOE 1995b). The risk-based WAC limits are derived from risk-based and dose-based Federal and State human health and environmental protection standards for radioactive and hazardous waste disposal activities. These limits are derived using fate and transport models and risk assessment exposure models to provide radionuclide activity concentration-based or chemical concentration-based WAC at defined point-of-assessment (POA) locations downgradient of the OSDC sites (i.e., WAC receptor). In accordance with the DFF&O, the time period (i.e., time of compliance) over which the facility must be evaluated to ensure protection of the public and environment, is 1000 years following facility closure, which assumes that post-closure activities have ceased (i.e., 30-year post-closure period has ended).

The following are risk goals for the cumulative radiological and chemical impacts to a hypothetical receptor from all waste disposed in an OSDC:

- For carcinogens, the excess life-time cancer risk (ELCR) is to be $\leq 1 \times 10^{-5}$ for the first 1,000 years after closure.

- For non-carcinogens, the hazard index (HI) is to be ≤ 1 for the first 1,000 years after closure.

Other dose-based DOE and U.S. Nuclear Regulatory Commission (NRC) (or State of Ohio) performance measures, including application of as low as reasonably achievable (ALARA) measures, will be established in the identification of ARARs development process.

The 1,000-year time of compliance is consistent with DOE Manual 435.1-1 "Radioactive Waste Management," which requires DOE to demonstrate with reasonable expectation that members of the public will be protected for 1,000 years after closure of a LLW disposal facility (DOE 2001). Relevant design standards, namely 40 *Code of Federal Regulations* (*CFR*) 192, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," contemplate a compliance period of 200 to

1,000 years (DOE 1995a). Longer time frames of interest (i.e., > 1,000 years) may be assessed in sensitivity analyses associated with the final analytic WAC.

The contaminant leaching analysis and conceptual site model (CSM) used to develop risk-based analytic WAC for an OSDC requires several predictions, which include the following:

- Infiltration of water into an OSDC
- Leaching of contaminants from the waste disposed within an OSDC into the underlying groundwater zone
- Transport of contamination from an OSDC to the receptor well and discharge to surface water bodies
- Subsequent uptake by the hypothetical receptor via applicable groundwater and surface water exposure pathways.

The POA for calculating the preliminary analytic WAC is the current DOE property boundary. Use of the property boundary as the POA is justified since there are no current or future plans for DOE to shrink the footprint as there are closed waste disposal facilities located across the site containing radioactive waste that must be managed for as long as the waste presents a hazard. During a May 25, 2010 technical meeting, DOE and regulators discussed the property boundary as an appropriate POA.

The POA is not the same concept as a point of compliance (POC). POA is the point(s) where a hypothetical receptor resides and performance-based modeling is performed to demonstrate protection of human health and the environment into the future. The POC for the OSDC will be the vertical limit of waste near the edge of the OSDC boundary. Protection of human health and the environment is assured at the POC through rigorous monitoring, surveillance and maintenance of the OSDC, and the commitment by DOE to perform corrective actions if required. These commitments are key tenets of RCRA Subtitle C hazardous waste disposal programs as well as DOE Order 458.1 "Radiological Protection of the Public and the Environment." For as long as the waste disposed in an OSDC presents a hazard, DOE is committed to maintaining institutional controls through such methods as monitoring and maintenance, deed restrictions, and ensuring site security (e.g., fencing) (DOE 2011).

While a resident farmer is not reasonably expected to reside on the current PORTS site property, this scenario is considered to provide an upper bound estimate of exposures, which may result in a lower analytic WAC, and hence was selected as the potential receptor.

The resident farmer exposure scenario provides a reasonable case to assess exposures to media potentially impacted as a result of migration of the modeled analytic WAC values from an OSDC through the following pathways:

- Ingestion of contaminated water – using water from a groundwater well
- Inhalation of volatiles while showering – using water from a groundwater well
- Dermal exposure while showering – using water from a groundwater well
- Consumption of homegrown vegetables/fruits irrigated with contaminated surface water
- Consumption of meat from cattle fed on vegetation irrigated with contaminated surface water.

This exposure scenario was selected for development of preliminary analytic WAC because it is consistent with similar evaluations performed for other on-site disposal facilities within the DOE complex

(DOE 1998a and 1998b) and is consistent with the current land use bordering the PORTS site. Modifications to the assumed exposure pathways, and/or assessment of additional exposure pathways, as appropriate, may be made during the final analytic WAC development process using input from Ohio EPA, the PORTS Site Specific Advisory Board, and the public.

C.3.2 KEY ASSUMPTIONS

Performance-based criteria for disposal of LLW (i.e., performance objectives) are found in both DOE Order 435.1, *Radioactive Waste Management*, and 10 *CFR* Part 61, *Licensing Requirements for Land Disposal of Radioactive Waste*, or the State of Ohio equivalent.

During scoping meetings, DOE PORTS and Ohio EPA have agreed to the following key assumptions specific to deriving preliminary analytic WAC:

- DOE would operate and close an OSDC within an approximately 20-year period.

- DOE would maintain institutional controls for 100-years post-closure. The leachate collection system is assumed to be fully functional for at least 30 years following final closure.

- The time of compliance is 1,000 years after institutional controls end; other timeframes of interest can also be assessed for sensitivity analyses.

- The POA was agreed to generally be the DOE PORTS site boundary, although an on-site POA downgradient from the potential OSDC sites was considered to provide a range of preliminary analytic WAC.

- The POC for monitoring and triggering corrective actions, as needed, is the edge of an OSDC.

- DOE is evaluating the suitability of an OSDC on the PORTS site by evaluating the following three of four study areas:

  - Study Area A, southeastern part of the PORTS site
  - Study Area B, immediately north of the X-333 building
  - Study Area C, hilltop area on far eastern boundary of the PORTS site.

- Preliminary analytic WAC are calculated for a specific set of contaminants of potential concern currently identified for the PORTS site.

The development of preliminary analytic WAC used conservative assumptions to ensure protectiveness and provide a reasonable upper bound of analytic WAC for each study area. For example, the development of the preliminary analytic WAC assumed that all waste is a soil or soil-like matrix with one K_d value per radiological and chemical constituent within the waste. Final analytic WAC may be developed that consider alternative forms of waste such as scrap metal, concrete, and treated waste forms that will have higher K_d values, which means the waste will be modeled to be less mobile and create potentially higher analytic WAC for these different matrices.

Another conservative assumption used in development of the preliminary analytic WAC is an additive approach to calculated risk from each radioisotope and/or chemical constituent that individually occurs within the first 1,000 years after closure. For the preliminary analytic WAC, all constituents that are

modeled to migrate from the OSDC within the first 1,000 years after closure and have a concentration at the POA(s) have a calculated analytic WAC. The risk from each single constituent to the resident-farmer is added together and collectively compared against the performance measures. For example, a highly mobile isotope may be modeled to be released and have a peak dose (and resultant risk) to the receptor in year 100 while other less mobile isotopes may not migrate from the OSDC and reach a hypothetical receptor until year 800. In the final analytic WAC for an OSDC, this conservative approach may not be used but rather, in this example, the more mobile isotopes may be assumed to be released and completely vacated from the OSDC before the less mobile isotopes begin migrating from the OSDC. This approach of "time-dependent-based" analytic WAC is an accepted and widely used approach for other DOE and/or NRC-regulated LLW disposal facilities.

Another conservatism in the preliminary analytic WAC, which ultimately may have the most significant impact, is not taking credit for the man-made features in the cap and liner such as HDPE liners beyond the 100-year expected period of active and passive institutional controls. The use of HDPE geomembrane liners in both the landfill cover and base liner systems (typically both a primary and secondary liner) are specifically prescribed by RCRA Subtitle C hazardous waste disposal regulations. Their purpose is primarily to retard the vertical migration of liquids (e.g., liners have extremely low hydraulic conductivity values), particularly when high volumes of leachate are expected such as during operations, and secondarily to facilitate leachate collection and removal. Until very recently, there were little to no long-term performance metrics for HDPE liners. The accepted approach in performance-based modeling was to assume the HDPE liners would not provide protection beyond the typical RCRA 30-year operational service life. For this reason, the Environmental Management Waste Management Facility in Oak Ridge, Tennessee, for example did not take credit for the HDPE liners beyond the 30-year operational period in its fate and transport model for WAC development. Landfill design and disposal experts have recently developed evidence through empirical testing and research that HDPE liners could perform their intended function for upwards of 500 to 1,000 years or more (Rowe 2009). Currently, neither EPA nor the NRC has developed regulations or guidance specific to assumptions regarding the expected longevity of HDPE liners. However, the NRC held a barriers workshop in August 2010 to gather information necessary to support future guidance development. Therefore, for this preliminary analytic WAC evaluation, DOE's assumption is that no long-term credit is taken for the HDPE membranes in either the cap or liner systems. For the final analytical WAC, alternative assumptions and sensitivity analyses of HDPE liners will be assessed, including assuming HDPE liners perform their intended function for longer periods of time (e.g., 500 years).

As the final analytic WAC are developed, other parameters of interest will be evaluated to assess whether their variability is sensitive to calculated analytic WAC results.

C.3.3 CONCEPTUAL OSDC DESIGN

A conceptual design of a potential OSDC has been developed to evaluate the ability to effectively manage the volumes and types of waste (e.g., radiological and hazardous waste streams) potentially projected to be placed in such a facility. Because an OSDC would manage waste with RCRA, TSCA, and radioactive contaminants, the conceptual design incorporates a number of elements associated with the various design requirements in the waste management regulations for each of these waste types. Understanding the physical design of the OSDC is essential in order to properly account for the impact of these design features in modeling contaminant transport.

The conceptual design of a potential OSDC contains elements of existing DOE- and U.S. Environmental Protection Agency (EPA)-approved on-site disposal facilities, including both closed (i.e., Fernald, Ohio [DOE 1995b]) and currently operating (i.e., DOE facility in Oak Ridge, Tennessee [DOE 1999]). The

conceptual OSDC cover and base liner include multiple layers designed to reduce water infiltration through the cap; maximize leachate collection and leak detection; minimize erosion; prevent human, plant root, and burrowing-animal intrusions into the wastes; and retard ex-filtration through the liner and into the underlying geologic materials. Ten discrete layers are incorporated into the cover design, and nine layers are incorporated into the base liner design below the waste. This following conceptual design was used to provide assumptions for calculation of the preliminary analytic WAC:

- A total cover thickness is 15 ft, including a 3-ft biointrusion layer that is sufficient to prevent inadvertent intrusion into the waste.

- The cover design includes a 5-ft vegetation layer (soil/rock matrix) on its top slope, underlain by a 1-ft drainage layer (graded natural materials such as sand and gravels), and a 3-ft biointrusion layer (larger rocks and boulders). Combined, these layers would simultaneously provide a robust medium to support root systems in the upper layer, drain away water to remove conditions normally required for roots to penetrate deeper, and create a barrier to deep-root penetration. The biointrusion layer would also discourage inadvertent drilling through the cap to construct a domestic water supply well. The upper portion of the cover would further prevent long-term erosion.

- The cover includes a geosynthetic clay layer and a 3-ft natural clay layer beneath the biointrusion and drainage layers, which presents both a man-made and natural barrier against water infiltration. The predicted combined effects of evapotranspiration in the vegetation layer, lateral transport out of the cover by the drainage layer, and the presence of the barrier layers would result in only a minimum amount of the average annual precipitation infiltrating into the waste. Empirical studies of leachate collected at closed disposal facilities at Fernald, Ohio, and Weldon Spring, Missouri, demonstrate that leachate volumes decrease significantly after the final cover is installed (Powell et al. 2011a and 2011b).

- The waste layer (50-ft thick) is purported to consist of contaminated soil; soil-like materials; scrap metal; cement-solidified waste; and debris (rubble) based on analysis of waste generation forecast information developed in support of Critical Decision-1 life-cycle baseline documentation (DOE 2006). These wastes are assumed to be placed in vertical lifts sufficient to minimize void spaces within the waste layer. Specific OSDC waste loading and operational plans and procedures will be developed in post-ROD documentation.

- The liner system includes a system to collect and remove any leachate generated during waste disposal operations, any water that might infiltrate the waste before final cover construction is completed, and any transient drainage that might occur shortly after the disposal cell was capped and closed. The liner also includes a secondary leachate detection system to confirm the cell liner system is functioning properly and to collect leachate that makes it through the primary liner.

- The liner design has a 3-ft, low-permeability clay layer overlaying currently existing geologic material of varying thickness above the seasonal high groundwater table. For most waste constituents, these layers would present a significant barrier to contaminant migration out of the cell and help prevent water from intruding into the wastes from beneath the cell.

The fully designed landfill system would allow an intrusion of only a minimum amount of the precipitation recharging to the groundwater through the waste. The conceptual OSDC design, including both the final cap and base liner used for preliminary analytic WAC development, is depicted in Figure C.3.

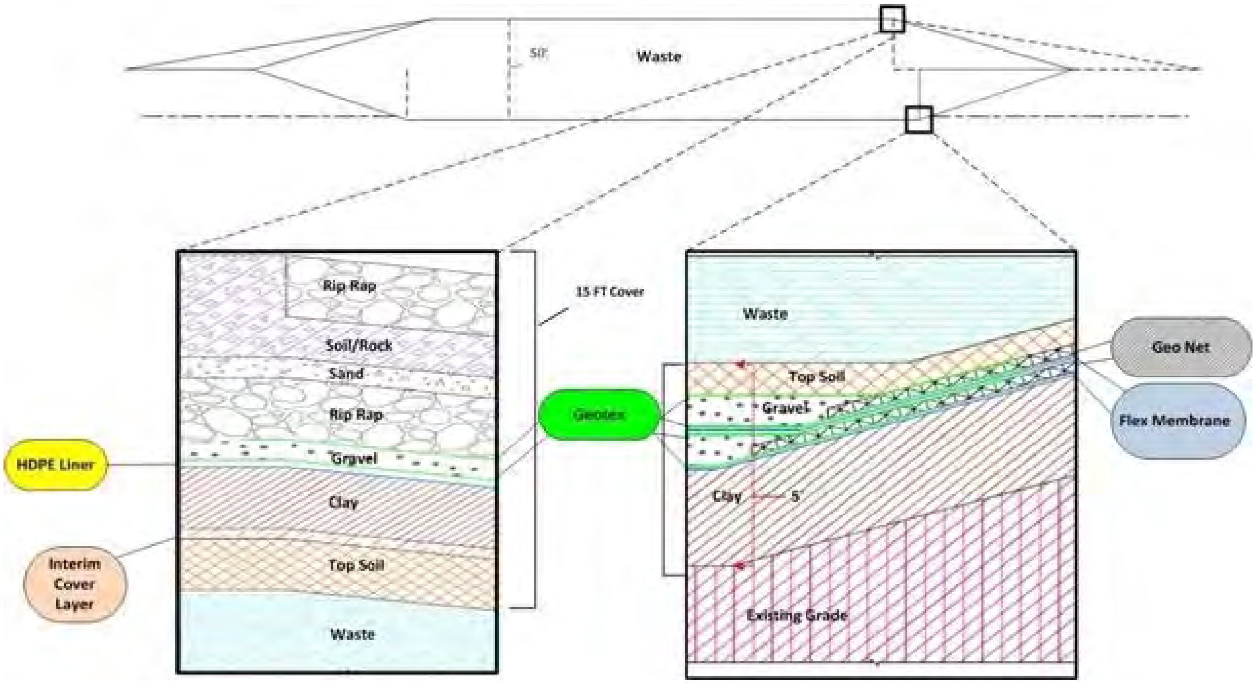

Figure C.3. Cross Section of OSDC Cover and Liner Systems

C.3.3.1 Conceptual Site Model

Development and understanding of a CSM was necessary prior to calculating preliminary analytic WAC. The PORTS site is located above glacial till, Minford clay, a relatively shallow Gallia saturated zone and the Berea sandstone layer that traverses the entire site in which more consistent and substantive volumes of groundwater reside (see Figure C.2). The direction of groundwater flow in the Gallia varies across the site but generally flows outward toward the property boundary. The direction of groundwater flow in the deeper Berea sandstone is west to east.

The concept of an above-grade solid radioactive and/or RCRA waste disposal facility is common and well understood. The predominant and long-term migration pathway to human and ecological receptors is contaminated water that exits the underside of a disposal facility, enters a saturated zone, and traverses laterally downgradient to a receptor located beyond a buffer zone surrounding the disposal facility. Figure C.4 below illustrates the CSM and specifically the primary steps in the analytic WAC development process. As part of the PORTS Sitewide Waste Disposition Evaluation RI/FS, the project will define the source estimate in terms of volume of waste and an assumed concentration for each radioisotope and hazardous constituent (i.e., Step 1 on Figure C.4). Using the analytical models and tools described in Section C.3.4, calculations of dose and associated risk are performed (i.e., Steps 2-5 on Figure C.4). The point source concentration is then adjusted upward or downward, as appropriate, to equal the performance measure (i.e., acceptable risk goal). In the case of developing preliminary analytic WAC for a potential OSDC, the performance measure is to ensure the calculated risk is less than 1×10^{-5} and the HI is equal to or less than 1 for 1,000 years post-closure.

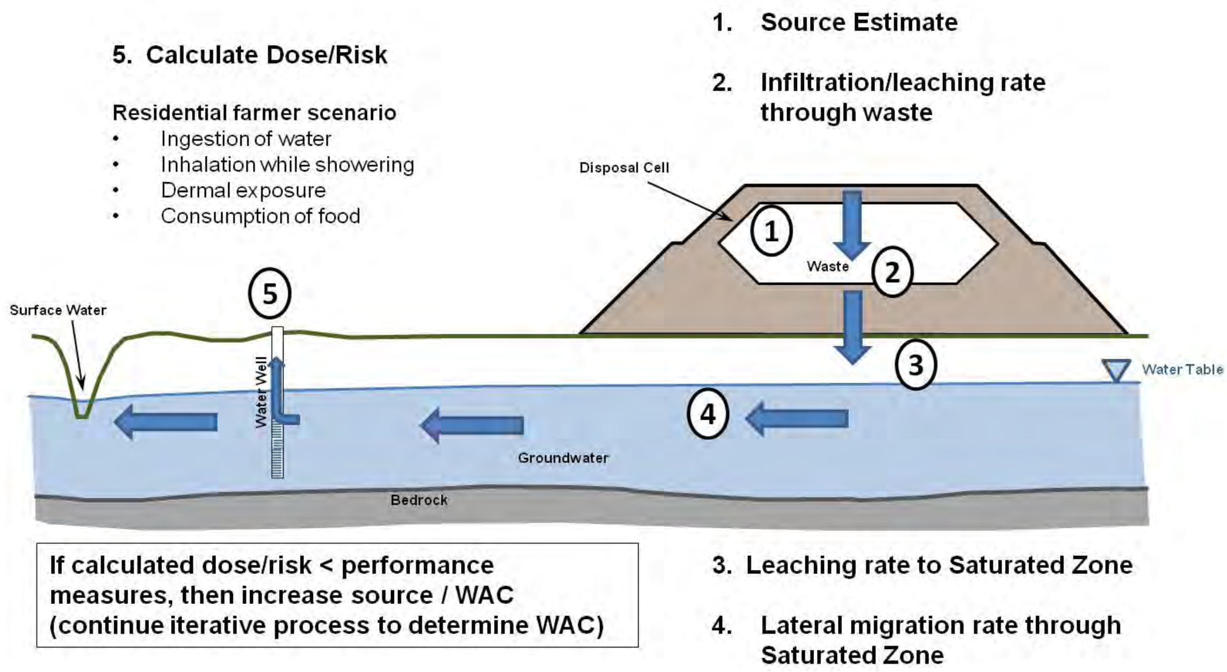

Figure C.4. Conceptual Site Model for OSDC Analytic WAC Development

C.3.3.2 OSDC Design-based and Performance-based Standards
The OSDC would be developed using the following combination of two distinct regulatory approaches:

- Design-based standards (e.g., RCRA Subtitle C, 40 *CFR* 192, Uranium Mill Tailings)
- Performance-based standards (e.g., DOE Manual 435.1-1, "Radioactive Waste Management")

A key component of design-based standards is the reliance of engineered barriers such as man-made liners (e.g., high-density polyethylene [HDPE] liners) and natural material liners (e.g., compacted clay layers). Once a facility is constructed and certified in accordance with the design-based standard, protection of human health and the environment relies on monitoring and a commitment to future corrective actions (if needed).

A key component of performance-based standards is performing fate and transport modeling of hypothetical releases of water (carrying radioactive and/or hazardous constituents) from an OSDC to a hypothetical receptor. Protection of the hypothetical future receptor at a POA is assured by the development (through back calculation) of WAC that governs future volumes, concentrations, and forms of waste disposed in an OSDC.

A PORTS OSDC, like other similar DOE waste disposal facilities, would combine the design-based and performance-based approaches to satisfy ARARs and to-be-considered (TBC) requirements. Real time protection of actual members of the public from the OSDC, and any other sources from the PORTS site, would be ensured through compliance with DOE Order 458.1, *Radiation Protection of the Public and the Environment*. This order requires DOE to actively inspect and monitor the PORTS site, including an OSDC, if developed, and maintain institutional controls as long as disposed and/or residual waste presents an unacceptable hazard to members of the public if access to the waste should occur.

C.3.4 METHOD TO DEVELOP PRELIMINARY ANALYTIC WAC

Developing preliminary analytic WAC for a constituent requires determining the risk to a potentially exposed resident farmer from a unit concentration of a constituent in the waste that occupies the entire disposal facility volume (i.e., 1 Ci/m^3 for radiological constituents and 1 mg/kg for nonradiological constituents), which is referred to as "unit source term." The risk and HIs calculated for modeled unit source terms at the POA are then used to rescale the analytic WAC to correspond to the 1×10^{-5} ELCR and HI of 1 for protecting the resident farmer receptor in the 1,000-year compliance period. For exposures corresponding to peak concentrations occurring after 1,000 years, a WAC can be developed for constituents arriving after 1,000 years through sensitivity analysis and risk management decision making.

The preliminary analytic WAC development process is depicted in Figure C.5.

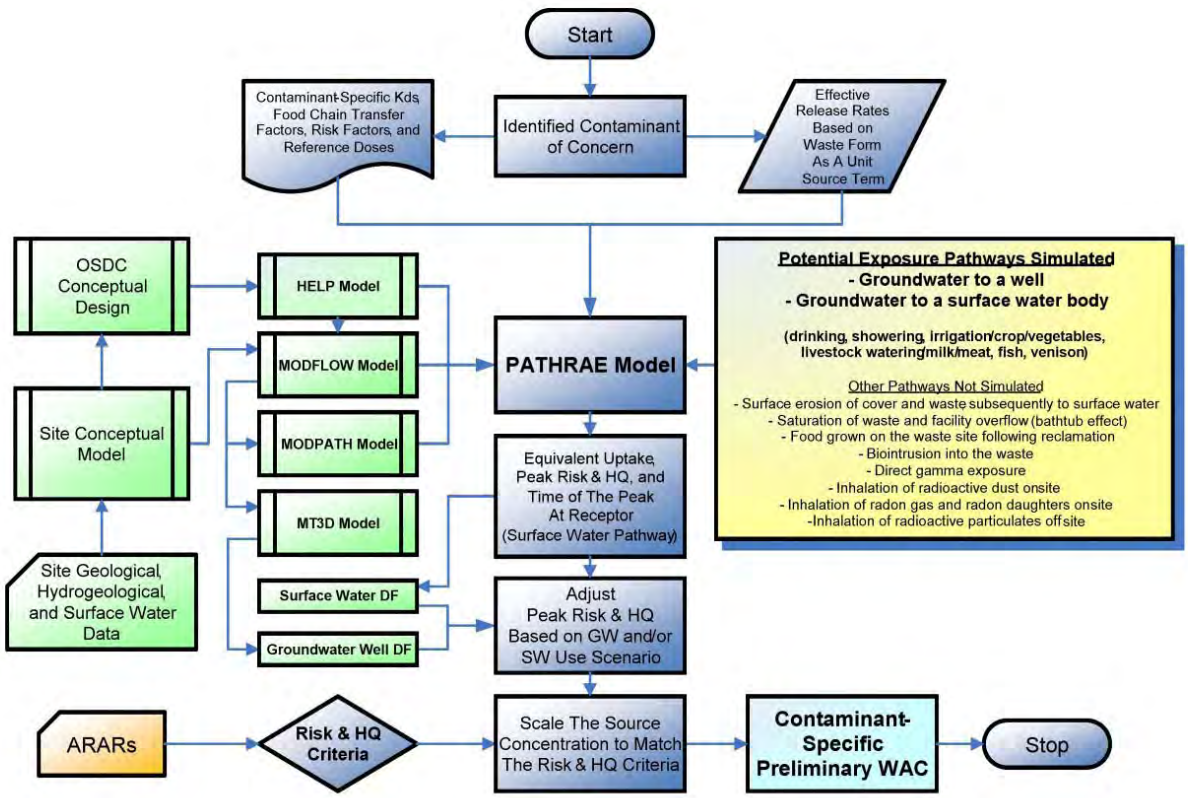

Figure C.5. Overview of Preliminary Analytic WAC Modeling

The exposure pathways from a disposal cell to surface water and disposal cell to groundwater are analyzed using the PATHRAE-HAZ/RAD analytical model (Rogers and Associates Engineering 1995a and 1995b), which is an improved version of the original risk performance code (PATHRAE-EPA) developed for EPA (Rogers and Hung 1987) to determine peak surface water and groundwater well

concentrations. In addition to waste volume and waste characteristics data, PATHRAE-HAZ/RAD relies on parameter inputs from the following additional models:

- Hydrologic Evaluation of Landfill Performance (HELP) [Schroeder et al. 1994] for infiltration rate through the landfill
- MODFLOW (McDonald and Harbaugh 1988) for groundwater flow field, path, and discharge locations and rates
- MODPATH (Pollock 1989) for constituent travel times and paths from specific groundwater entrance points below the cell to receptor locations
- MT3D (Zheng 1990) for contaminant distribution within the groundwater flow field.

Peak contaminant concentrations in the groundwater well are determined by PATHRAE, where applicable. Additionally, the peak contaminant concentrations for surface water at the point of discharge from the OSDC are determined by PATHRAE. However, the concentration at the POA (i.e., downstream from the point of discharge) is calculated using a mixing factor approach, which is a mass balance that considers surface water flow volume differences between the stretch of surface water at the point of discharge to that at the exposure point (i.e., POA).

In summary, the following assumptions were used to develop the preliminary analytic WAC:

- Disposal Cells – Two volume assumptions based on estimated PORTS waste forecast information include a 1-million- and 3-million-cy waste cell at the three study areas (A, B, and C); average waste thickness within an OSDC is assumed to be 50 ft; basic design parameters for similar DOE disposal facilities were adapted for the preliminary analytic WAC for a PORTS OSDC; and an OSDC would generally be constructed above the current ground surface, including approximately 10 ft of in situ geologic material that might consist of reworked on-site soil, as necessary.
- Receptors – For preliminary analytic WAC calculations that are protective of human health, the receptor(s) were placed at the DOE property boundary using surface water that has continuous water flow and groundwater from wells that can support typical domestic water needs (i.e., 240 gal/day based on an average use of 50 to 80 gallons per person per day [Heaton 1999]).
- Waste characteristics – Currently available site-specific information for K_d values and other input parameters were used wherever available (see Attachment, Table 4). Model default and/or literature values were used in the absence of site-specific information, and the modeled waste forms were assumed to be soil or a soil-like matrix.

C.3.5 MODELS USED TO DEVELOP PRELIMINARY WAC

This section provides descriptions of the computer models that were used to develop the preliminary analytic WAC for a potential OSDC at PORTS. To support the specific objectives of this document and the preliminary analytic WAC, existing and proven modeling tools, input parameters, and processes were used with the work completed within the context of the DFF&O requirements.

C.3.5.1 PATHRAE-HAZ/RAD Model

PATHRAE-HAZ/RAD (Rogers and Associates Engineering 1995a and 1995b) are computer codes capable of assessing multiple transport pathways for hazardous/radiological contaminants that have the

potential to impact receptors. These codes were used to develop preliminary analytic WAC concentrations for a potential OSDC. PATHRAE-HAZ/RAD was originally developed for EPA (PATHRAE-EPA) use in the preparation of standards for management of LLW (Rogers and Hung 1987). PATHRAE-HAZ/RAD can be used to estimate risks and doses of contaminants to receptors from possible releases (and subsequent transport through multiple pathways) from land disposal units containing chemical and radioactive wastes. These codes can be used to calculate risks at specified points in time and peak risks (in time) to receptors at any number of key locations inside or outside the boundaries of a disposal facility and study areas.

The PATHRAE-HAZ/RAD code is available in the public domain. This model performs tasks similar to those of other pathway analysis codes such as RESRAD (Yu 1993). A benchmarking comparative study by the RESRAD team concluded that the radiological doses predicted by the RESRAD and PATHRAE codes for inhalation and ingestion pathways are in relatively good agreement (Faillace, Cheng, and Yu 1994). The study concluded that differences were caused primarily by the transfer factors and dose conversion factors used in the dose calculations. Transfer factors and dose conversion factors used specifically for development of these preliminary analytic WAC were PORTS-specific or accepted literature values wherever possible.

One advantage of the PATHRAE-HAZ/RAD family of codes is their simplicity of operation and presentation of results while still allowing the analysis of a comprehensive set of contaminants and pathways to human receptors. This allows easy identification of parameters important for protection of the public from potential releases. The PATHRAE-HAZ/RAD codes have also supported disposal facility WAC development at other DOE sites with acceptance by EPA and State regulators.

PATHRAE-HAZ/RAD can model up to nine pathways by which contaminants can move from a disposal facility to receptors. The principal exposure pathway of concern for PATHRAE-HAZ/RAD modeling is the release of waste constituents into precipitation infiltrating through the cap and into the wastes, with subsequent pore water transport of these released contaminants through the underlying OSDC cell liner and vadose zone. Transport occurs into the underlying groundwater and continues through the saturated zone directly to a hydraulically downgradient tributary. Potential exposures are then calculated for groundwater extracted from a well used for domestic purposes and for surface water used for agricultural purposes at the POA(s).

Many of the PATHRAE-HAZ/RAD input values are obtained from accepted risk assessment literature such as plant uptake, receptor intake parameters, and toxicity factors (EPA 1991). However, several key components are calculated using additional models and site-specific information (e.g., water infiltration rates, groundwater transport parameters, and contaminant release rates for various waste forms). The following sections describe the various supporting models for PATHRAE-HAZ/RAD and the input parameters for their analyses.

All wastes are conservatively assumed to have a soil-like form with a density of 1.8 g/cm^3 and be characterized by K_d (solid to liquid ratio) leaching. Retardation of solute transport through the vadose and aquifer zones is also represented by the appropriate K_d values. The RI/FS will further evaluate specific constituents or waste forms to confirm the calculated model results are indeed an accurate depiction of the OSDC conceptual fate and transport modeling approach.

Key parameters needed by the PATHRAE-HAZ/RAD model are summarized in Table C.1.

Table C.1. PORTS Preliminary WAC Model Summary

Physical Process	Solution Methodology	Parameters Needed
Rate of water infiltration into the waste cell	HELP model	Site-specific climatic parameters; disposal cell design parameters; vadose zone hydrological parameters
Contaminant release rates from the waste disposal forms to the surrounding backfill soils	K_d leaching mechanisms and waste diffusion processes	Site-specific and generic K_d factors for soils and cement wastes; generic diffusion parameters
Material retardation characteristics (i.e., ability of a material to retard the movement of contaminants) within and away from a potential OSDC	K_d equilibrium mechanisms with backfill soils, vadose zone soils, and saturated media	Site-specific and generic K_d factors for soils and saturated zone media
Groundwater transport characteristics	MODFLOW and MODPATH models	Site-specific and generic hydrogeologic parameters
Groundwater interactions with surface water	PATHRAE model	Surface water flow parameters, and MODFLOW and MODPATH results
Contaminant uptake	PATHRAE model	Parameters for the food chain, and intake rates for human receptors consuming contaminated food and water
Contaminant toxicological factors (i.e., carcinogen slope factors and non-carcinogen reference doses)	PATHRAE model	Cancer slope factors and reference doses: • Integrated Risk Information System • Health Effects Assessment Summary Tables

HELP = Hydrologic Evaluation of Landfill Performance
PORTS = Portsmouth Gaseous Diffusion Plant
WAC = waste acceptance criteria

C.3.5.2 HELP Model

The HELP model was used to evaluate the water budget for a potential OSDC cell. The purpose of the model is to calculate the infiltration rates to groundwater through the varying layers of a potential OSDC, including the cover (or cap), waste layer, liner system, and unsaturated zone. This information is used for risk analysis using PATHRAE-HAZ/RAD and other models.

The HELP computer program is a quasi-two-dimensional hydrologic model of water movement across, into, through, and out of landfills. This model accepts weather, soil, and design data and uses solution techniques that account for the effects of surface storage, snowmelt, runoff, infiltration, evapotranspiration, vegetative growth, soil moisture storage, lateral subsurface drainage, leachate recirculation, unsaturated vertical drainage, and leakage through soil, geomembrane, or composite liners. Landfill systems with various combinations of vegetation, cover soils, waste cells, lateral drain layers, low-permeability barrier clays and/or soils, and synthetic geomembrane liners may be modeled. The HELP model was developed to help hazardous waste landfill designers and regulators evaluate the hydrologic performance of proposed landfill designs. The program was designed to conduct water balance analyses for landfills, cover systems, and solid waste disposal and containment facilities. As such, the model facilitates rapid estimation of the amounts of runoff, evapotranspiration, drainage, leachate collection, and liner leakage that may be expected to result from operations involving a wide variety of landfill designs. The HELP model requires general climate data, design parameters, and soil characteristics to perform the analysis.

Climatic data. The general climate data needed include growing season, average quarterly relative humidity, normal mean monthly temperatures and precipitation, maximum leaf area index, evaporative zone depth, and latitude. PORTS site meteorological data were used for preliminary analytic WAC development wherever available. Other parameters such as solar radiation and growing season were taken from the database provided in the HELP model, using the default values for the Portsmouth area.

Design parameters. OSDC design parameters include such items as the slope and maximum drainage distance for lateral drainage layers, layer thickness, layer description, area, leachate recirculation procedure, subsurface inflows, surface characteristics, and geomembrane characteristics.

Soil characteristics. Necessary soil data include porosity, field capacity, wilting point, saturated hydraulic conductivity, initial moisture storage, and the U.S. Soil Conservation Service runoff curve number. The porosity, field capacity, wilting point, and saturated hydraulic conductivity are used to estimate the soil-water evaporation coefficient and Brooks-Corey soil moisture retention parameters. The HELP model contains default soil characteristics for 42 material types for use when measurements or site-specific estimates are not available. The proposed engineering design for a potential OSDC that will be developed in parallel with decision documentation will be used for the final analytic WAC calculations and also documented in post-ROD documents. Geotechnical parameters used in the model for each layer will also be based on final design criteria.

To support the objectives of the preliminary analytic WAC, no credit was taken for man-made engineered layers in either the cap or liner (i.e., only natural materials are considered). For example, the drainage layers in the cover and liner systems are assumed to be ineffective in retarding vertical migration, and the drainage layers have become vertical percolation layers rather than lateral water removal systems, therefore, no water is assumed to flow out of these drainage layers. The rest of the engineered natural materials (i.e., compacted clay layers) maintain their properties throughout the compliance period and only consider degradation by natural processes accounted for in the HELP model.

For this case, the infiltration (percolation) rate to groundwater from the waste cells is modeled. Because the preliminary analytic WAC are conservative in nature and meant to derive conservative values to support an initial evaluation of on-site waste disposal, this assumption is deemed appropriate for preliminary WAC calculations.

The HELP model simulations also calculate the soil moisture contents for the model layers. To determine the change in soil moisture content and calculate the steady-state soil moisture contents for the long-term scenario, multiple time periods are simulated.

C.3.5.3 MODFLOW and MODPATH Models

MODFLOW and MODPATH were used to evaluate the hydrogeologic conditions and parameters in the candidate sites for a potential OSDC. The estimated parameters include groundwater flow path, travel time, velocity, and flux rate.

MODFLOW is a modular, block-centered, finite-difference groundwater flow code developed by the U.S. Geological Survey (USGS) that is capable of simulating both transient and steady-state saturated groundwater flow in one, two, or three dimensions. MODFLOW calculates potentiometric head distribution, flow rates, velocities, and water balances throughout an aquifer system. It also includes modules simulating recharge, flow towards wells, and groundwater flow into drains, streams, and rivers. A number of different boundary conditions are available, including specified head, areal recharge,

injection or extraction wells, evapotranspiration, drains, streams, or rivers. Aquifers can be simulated as unconfined, confined, or a combination of unconfined and confined.

MODFLOW is used for the analysis because it is in the public domain; is widely used by the industrial, scientific, and governmental communities; has been rigorously tested and verified; and has a variety of software tools that are publicly available for graphical preprocessing and post-processing. In addition, MODFLOW has been used as the code for the PORTS sitewide groundwater flow model (LATA/Parallax Portsmouth, LLC [LPP] 2010).

MODPATH is a three-dimensional, particle tracking, post-processing program designed for use with output from the steady-state simulations obtained using MODFLOW. MODPATH can be used to compute three-dimensional path lines, compute positions of particles at specified points in time, discharge point coordinates, and total time of travel for each particle. MODPATH uses a semi-analytical, particle-tracking scheme. This method is based on the assumption that each directional velocity component varies linearly within a grid cell in its own coordinate direction, which allows the generation of an analytical expression describing the flow path within a grid cell. Given the initial position of a particle anywhere in a cell, the coordinates of any other point along its path line within the cell (and the time of travel between them) can be computed directly.

MODFLOW Simulations. Groundwater flow simulations, which are based on the disposal cell design and future site condition, are conducted to predict the future groundwater level and flow regime. Depth-to-groundwater information is used to conduct a vadose zone transport analysis.

MODPATH Simulations. Preferred groundwater flow paths from the source areas (i.e., OSDC footprint) to the possible exposure points along the surface creek and its tributaries are determined from particle-tracking simulations using MODPATH and based on MODFLOW simulation results. The particles are placed in the source areas under the potential waste cells and flow along the dominant hydraulic directions calculated on the basis of the model simulations.

Using the groundwater models, groundwater travel times are calculated along the flow path lines to exposure points during the particle-tracking simulations. Groundwater flux rates and discharge rates to the surface creeks and their segments are also calculated on the basis of MODFLOW results.

C.3.5.4 MT3D Model

The movement of contaminants in groundwater from the waste cell to points of exposure outside of the waste disposal site are simulated by using MT3D (Zheng 1990), a three-dimensional contaminant fate and transport model code.

MT3D is a comprehensive, three-dimensional numerical model for simulating solute transport in complex hydrogeologic settings. It is a numerical simulation code that models the fate and transport of dissolved, single-species contaminants in saturated groundwater systems. MT3D calculates concentration distributions, concentration histories at selected receptor points, hydraulic sinks (e.g., extraction wells), and the mass of contaminants in the groundwater system. The code can simulate three-dimensional transport in complex, steady-state, and transient flow fields. It can also represent anisotropic dispersion, source-sink mixing processes, first order transformation reactions, and linear and nonlinear sorption. MT3D offers the user a choice of four solution options, which make it well suited for handling a wide range of conditions. The method used for calculating preliminary analytic WAC is the standard finite difference method.

MT3D is linked with MODFLOW and is designed specifically to handle advectively dominated transport problems without the need to construct refined models specifically for solute transport. It is a popular three-dimensional solute transport code and has been used successfully to model hydrogeologic conditions at a variety of sites. MT3D is widely accepted by regulators and the groundwater consulting and research communities.

C.4. PRELIMINARY ANALYTIC WAC RESULTS

C.4.1 STUDY AREA A

Study Area A is located in the southeast area of the PORTS site (see Figure C.6) and is mostly undisturbed by historical DOE operations, except for an airplane landing strip initially developed across much of the study area. There are no known contaminants or DOE releases of contaminants to soils in this study area.

For Study Area A, the following preliminary analytic WAC were developed for the 1 million cy and 3 million cy OSDC volume cases:

- The on-site POA is located southwest of the potential OSDC near the head of a surface water body at the southern end of the PORTS site. Under this scenario, both surface water (SW-1) and groundwater (GW-1) represent the exposure media considered for the analytic WAC development. The surface body currently serves as a drainage basin for the PORTS industrial area. Historical topographic maps of the PORTS site prior to construction of the site in 1953 shows the presence of the upper reaches of Big Run Creek so the assumption is that this watercourse will remain in-place through the compliance period (i.e., 1000 years).

- The POA at the DOE property boundary is located at the southern most part of the PORTS site. However, under this scenario, surface water in Big Run Creek (SW-2) is the only exposure medium since the preliminary analytic WAC modeling results demonstrate that the well (GW-2) is not impacted by modeled contaminant releases from the OSDC located in Study Area A. Therefore, the groundwater well is shown to be uncontaminated because the modeled plume from the potential OSDC in Study Area A never reaches this receptor POA location (i.e., the modeled plume discharges to Big Run Creek). Therefore, only the surface water exposure pathway at the DOE property boundary POA is relevant in calculating preliminary analytic WAC for this study area.

The facility footprint and receptor location for a modeled potential OSDC in Study Area A are illustrated in Figure C.7.

C.4.2 STUDY AREA B

Study Area B is located in the northern/industrial area of the PORTS site just north of the X-333 building (see Figure C.8). Study Area B has been developed and impacted by historical DOE operations, but is currently undergoing cleanout and clean up. The location is bordered by closed and permitted solid waste landfills to the north (X-734 and X-735). Given that Study Area B is within the industrialized portion of the PORTS facility, constituents have been detected in soil sample locations, some of which exceed background levels and/or industrial preliminary remediation goals (primarily metals). Additional field studies are required to confirm if additional environmental media remediation would be necessary.

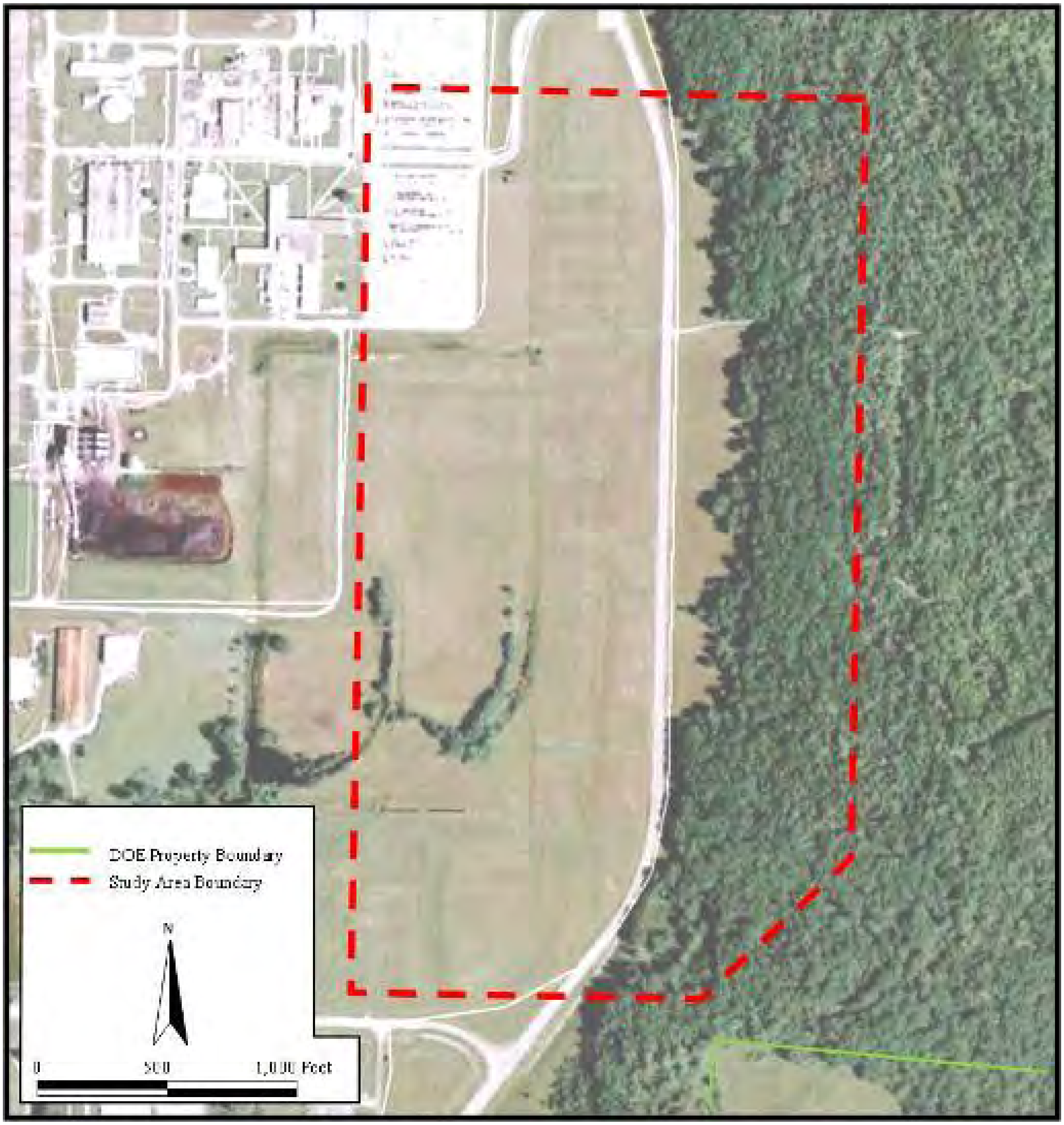

Figure C.6. Study Area A for a Potential OSDC

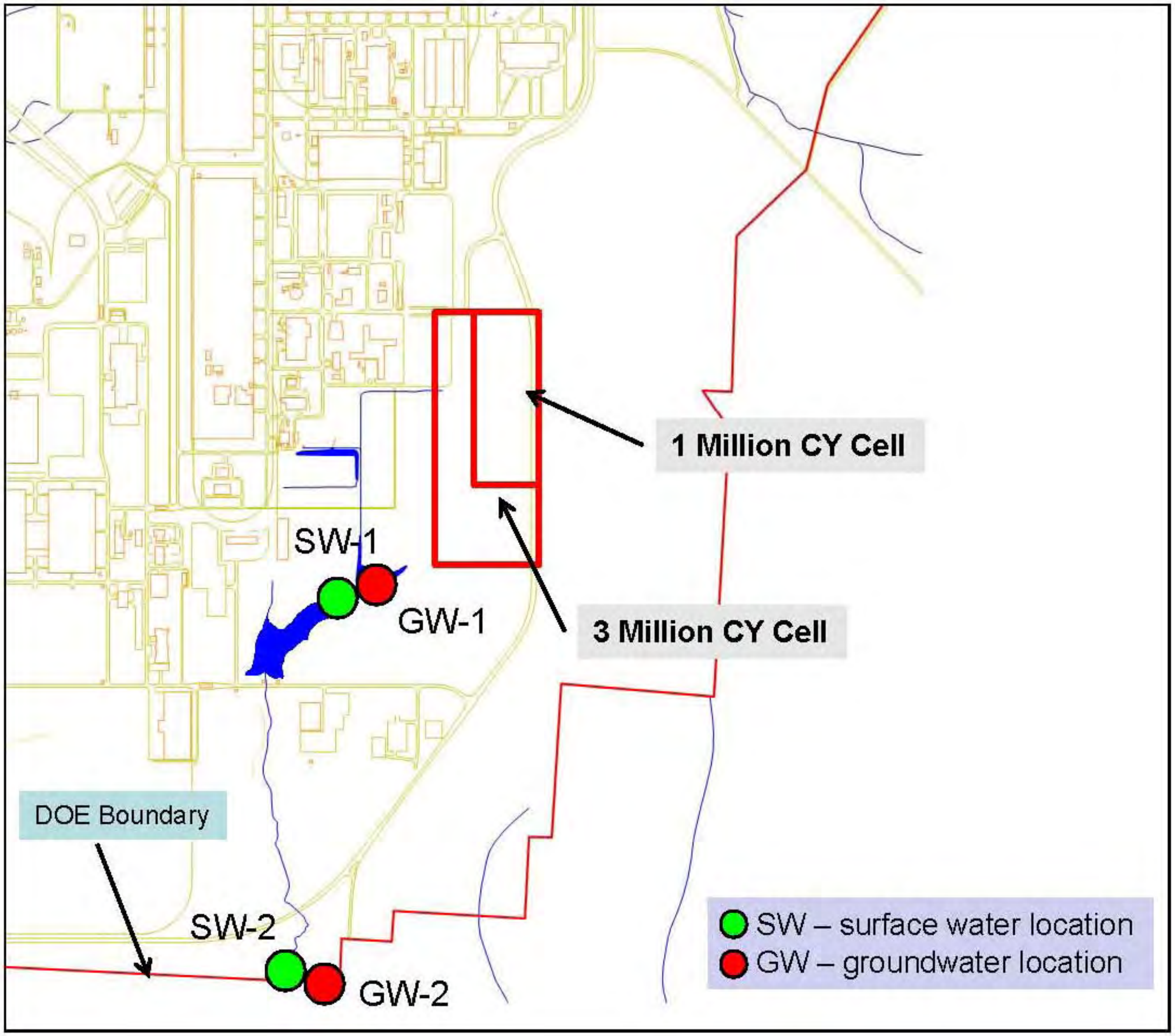

Figure C.7. Study Area A Potential Disposal Cell Footprint and Surface Water and Groundwater Exposure Locations

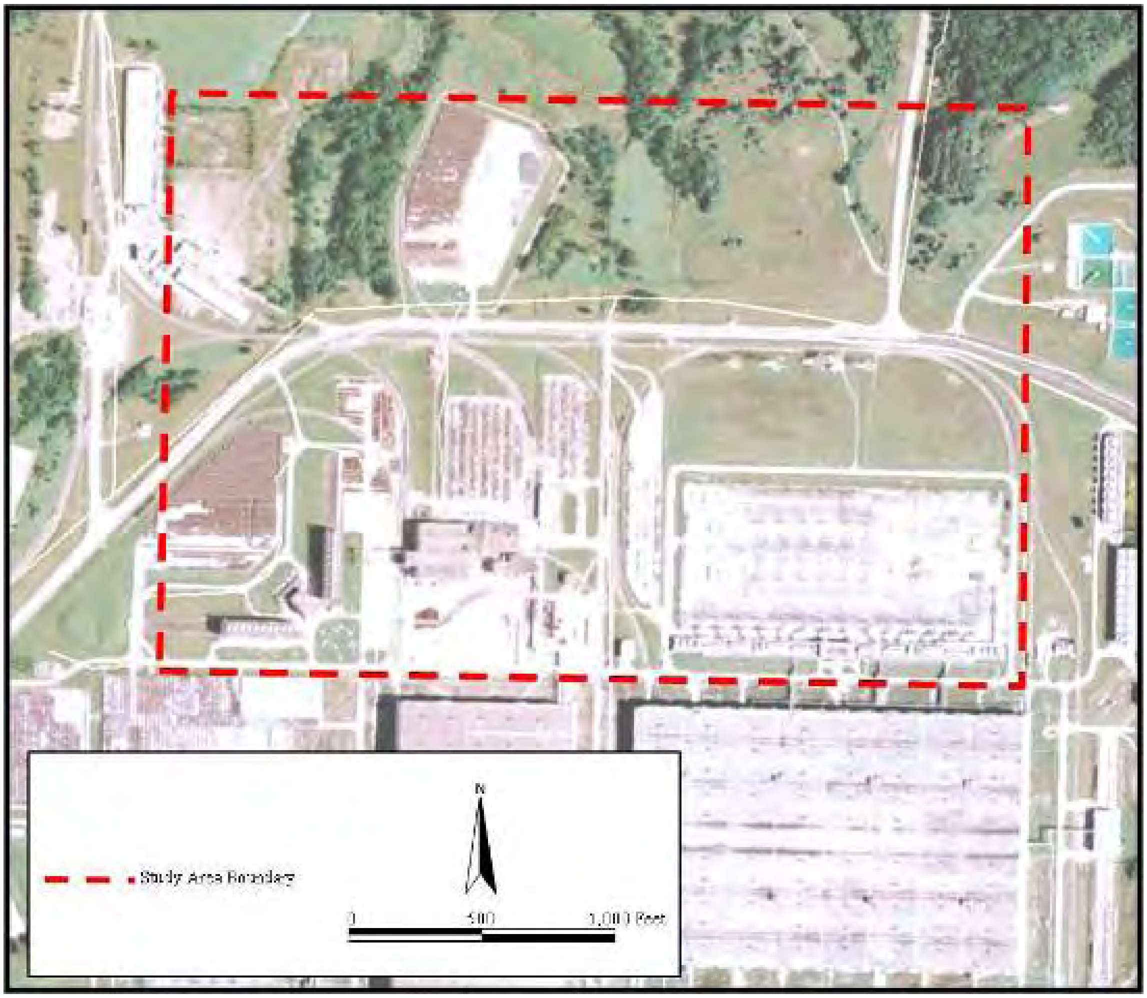

Figure C.8. Study Area B for a Potential OSDC.

For Study Area B, the following preliminary analytic WAC were developed for the 1 million and 3 million cy OSDC volume cases:

- The on-site POA is located north of the potential OSDC along Little Beaver Creek, with the groundwater well (GW-1) just south of the creek and the surface water exposure point (SW-1) in the creek at the confluence with the northern tributary into Little Beaver Creek. For this POA, both contaminated surface water and groundwater represent the exposure media considered for the preliminary analytic WAC development.

- The POA at the DOE property boundary is located at the northwestern most part of the PORTS site. However, under this scenario, surface water (SW-2) is the only exposure medium since the groundwater well (GW-2) at this point of exposure is shown to be uncontaminated because the modeled plume from the potential OSDC in Study Area B never reaches this well location. Therefore, only the contaminated surface water from the OSDC and related agricultural exposure pathways are relevant in calculating preliminary analytic WAC for this study area.

The facility footprint and receptor location for a modeled potential OSDC in Study Area B is illustrated in Figure C.9.

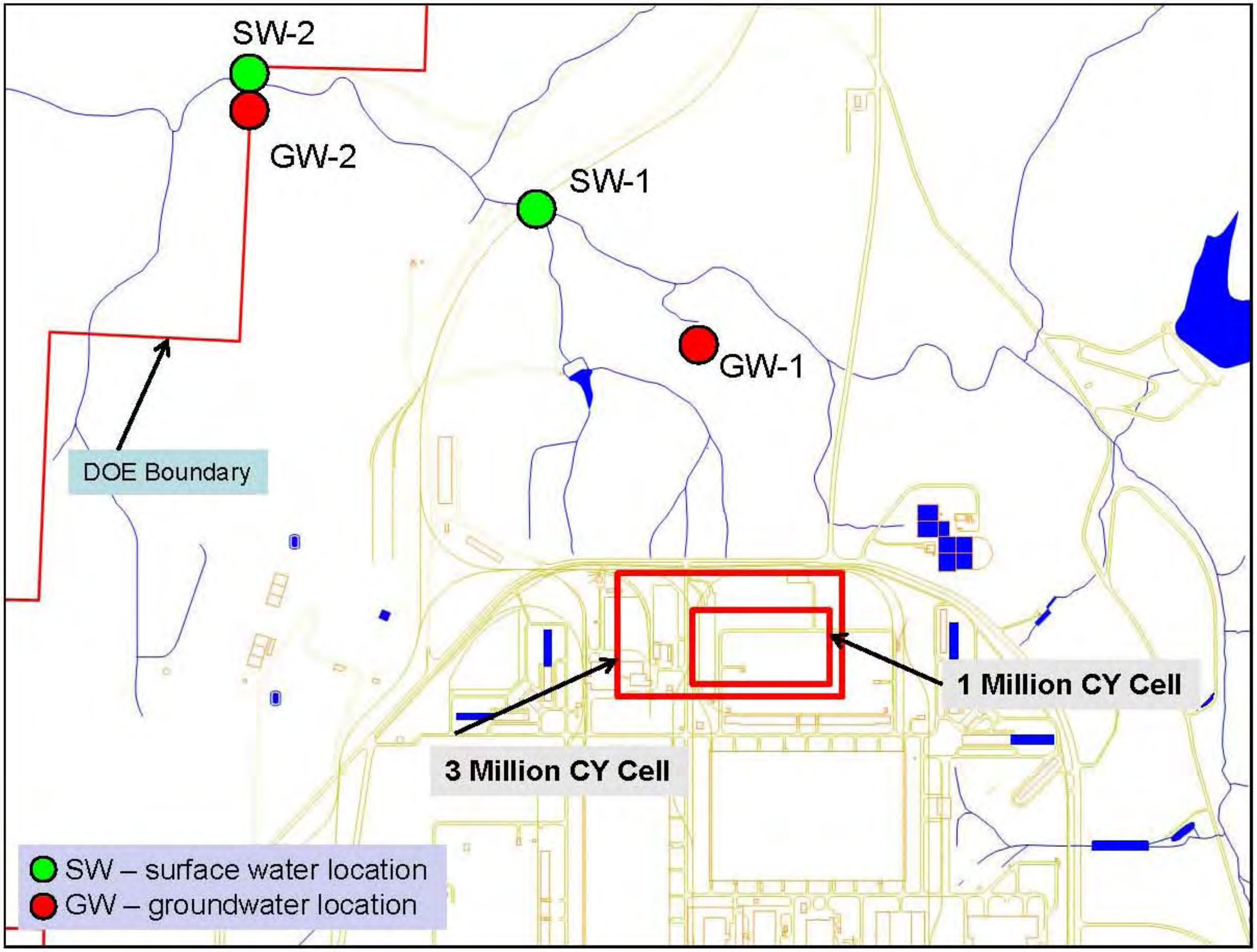

Figure C.9. Study Area B Potential Disposal Cell Footprint and Surface Water and Groundwater Exposure Locations

C.4.3 STUDY AREA C

Study Area C is located on a hilltop on the far eastern boundary of the PORTS site (see Figure C.10). The area is uncontaminated and within the buffer area for security and site operations. Some parts of Study Area C are known to be of interest under the National Historical Preservation Act due to the presence of historical homestead sites. The entirety of Study Area C is above or within the Cuyahoga Shale. Additional field studies and geotechnical sampling in Study Area C, as well as other study areas, will confirm if there are substantial fissures that would create vertical or horizontal pathways to modeled receptor locations.

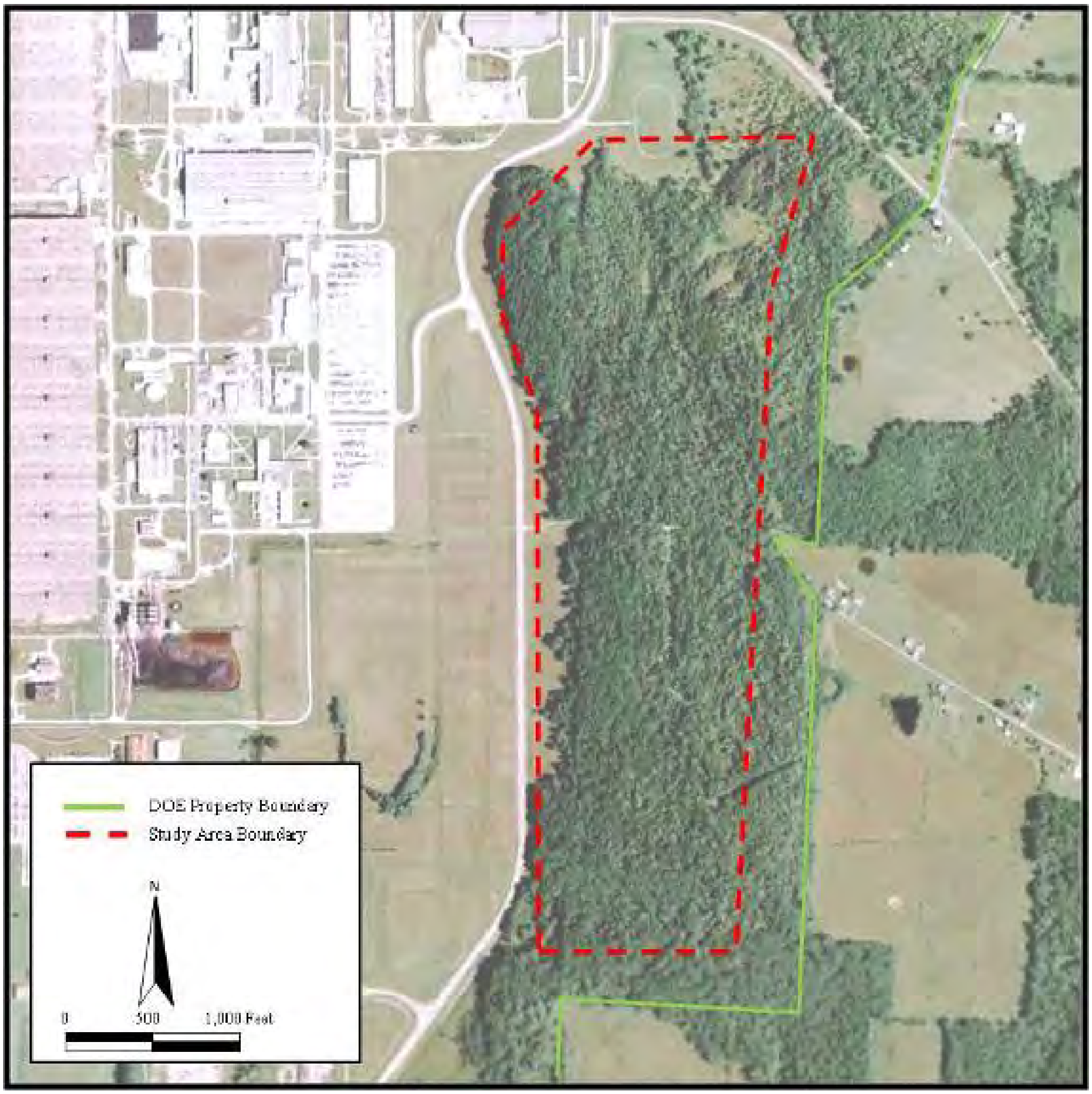

Figure C.10. Study Area C for a Potential OSDC.

For Study Area C, the following preliminary analytic WAC were developed for the 1 million and 3 million cy OSDC volume cases:

- Only one POA is considered for Site C since the potential OSDC is located just west of the DOE property line along the boundary due east of the potential OSDC in Study Area C. Unlike Study Areas A and B, Study Area C is located very near the PORTS site boundary. Since groundwater flow beneath this study area is to the east, only one POA is considered, which is generally coincident with the property boundary. Under this scenario, groundwater (GW) is the only exposure medium because the plume from Study Area C is modeled to flow directly downward approximately 70 ft through the Cuyahoga Shale and then due east. The models used for preliminary analytic WAC development do not predict leachate discharge to any surface water body (SW) immediately downgradient from Study Area C. Therefore, only the groundwater exposure pathways are relevant in calculating preliminary analytic WAC for this study area.

Results indicate that no OSDC contaminants from the Study Area C location are modeled to arrive in the POA groundwater well in less than 1,000 years. These results demonstrate some of the technical and hydrogeologic advantages of Study Area C.

Receptor locations for the modeled potential OSDC in Study Area C for the 1 million and 3 million cy OSDC sizes, respectively, are illustrated in Figure C.11.

C.4.4 PRELIMINARY ANALYTIC WAC RESULTS

Below is a summary of the results of the preliminary analytic WAC modeled for the three candidate sites. Attachment 1 provides a more detailed calculation package including the PATHRAE model output for a single run for illustrative purposes.

C.4.4.1 Travel Time

The time for a contaminant to travel from the OSDC to an exposure point (i.e., POA) is a function of dimensions and properties of unsaturated and aquifer zones and the contaminant-specific chemical properties. For a contaminant without retardation, it will move with the water (i.e., K_d near 0). The water travel time in the unsaturated zone is a function of recharge rate, matrix property, and thickness. The travel time in the aquifer is a function of the properties and can be calculated using Darcy's flow equation.

MODFLOW simulations, based on the disposal cell design and future site condition, is used to predict the future groundwater level and flow regime for the preliminary WAC calculation. Depth to groundwater information is used to conduct the vadose zone transport analysis. Dominant groundwater flow paths from the source areas (OSDC waste mass) to the possible exposure points along the nearby surface creek and the water travel time are determined from particle tracking simulation using MODPATH, based on MODFLOW simulation results. Simulations of the groundwater regime rely on, as a starting point, the sitewide groundwater model developed for DOE (LPP 2010). Prior to performing modeling simulations, the sitewide groundwater model was enhanced by refining hydrogeologic contour lines in each of the Study Areas. Only Study Area C was not completely defined in the current sitewide groundwater model. RI sampling and geotechnical studies will be performed, and the results will be used to update and further refine the sitewide groundwater model. The time of peak dose for PORTS SRCs at each study site are shown in Tables C.2 through C.4. The SRC shown on Tables C.2 through C.4 are the expected PORTS-specific drivers for clean-up and OSDC WAC development. Also, as part of preliminary analytic WAC development, each type of constituent (e.g., radionuclide, inorganic, metal, etc.) was selected to ensure that the tools used effectively modeled the behavior of each type of SRC and the specific

constituents listed below. For Study Sites A and B, only three organic compounds have travel times to peak dose within the 1,000-year study time frame and one additional organic compound modeled just outside that time frame. No constituents are modeled to peak or have an appreciable concentration within the 1,000-year study time frame for Study Area C. These results were based on the assumption that Study Area C is a contiguous shale formation at a depth of nominally 80 ft with a very low hydraulic conductivity factor throughout.

Table C.2. PORTS Time of Peak Dose for a Potential OSDC at Study Site A

	1,000,000 cy		3,000,000 cy	
SRC	**On-site POA (years)**	**DOE boundary POA (years)**	**On-site POA (years)**	**DOE boundary POA (years)**
Antimony	44,133	44,133	44,039	44,039
Arsenic	44,133	44,133	44,039	44,039
Barium	126,981	126,981	126,724	126,724
Chloroform	2,200	2,200	1,823	1,823
Chromium III	23,420	23,420	23,367	23,367
Cyanide	23,190	23,190	23,138	23,138
1,1-Dichloroethene	664	664	654	654
Methylene Chloride	608	608	599	599
n-Nitroso-di-N-propylamine	1,316	1,316	1,306	1,306
Aroclor 1232	39,070	39,070	38,986	38,986
Trichloroethene	822	822	812	812
Tc-99	5,846	5,846	5,845	5,845
U-234	38,812	38,812	39,076	39,076
U-235	47,202	47,202	46,876	46,876
U-238	47,202	47,202	46,876	46,876
Np-237	84,517	84,517	85,950	85,950
Pu-239	83,170	83,170	84,512	84,512

DOE = U.S. Department of Energy
OSDC = on-site disposal cell
POA = point of assessment
PORTS = Portsmouth Gaseous Diffusion Plant
SRC = site-related contaminant

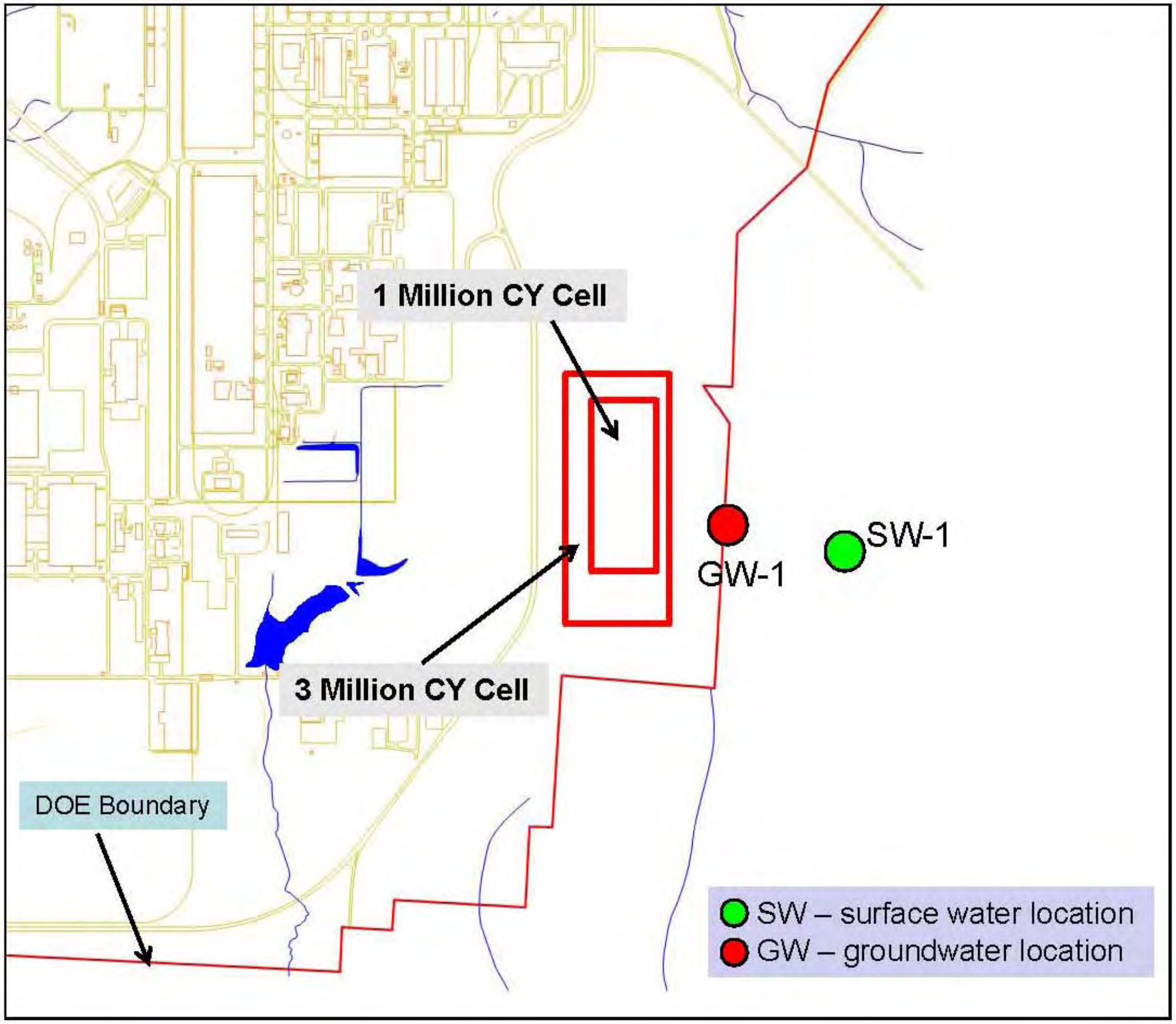

Figure C.11. Study Area C Potential Disposal Cell Footprint and Surface Water and Groundwater Exposure Locations

Table C.3. PORTS Time of Peak Dose for a Potential OSDC at Study Site B

SRC	1,000,000 cy On-site POA (years)	1,000,000 cy DOE boundary POA (years)	3,000,000 cy On-site POA (years)	3,000,000 cy DOE boundary POA (years)
Antimony	35,960	35,960	35,746	35,746
Arsenic	35,960	35,960	35,746	35,746
Barium	103,379	103,379	102,793	102,793
Chloroform	1,847	1,847	1,819	1,819
Chromium III	19,106	19,106	18,985	18,985
Cyanide	18,918	18,918	18,799	18,799
1,1-Dichloroethene	497	497	479	479
Methylene Chloride	551	551	442	442
n-Nitroso-di-N-propylamine	1,128	1,128	1,103	1,103
Aroclor 1232	31,840	31,840	31,649	31,649
Trichloroethene	726	726	703	703
Tc-99	4,728	4,728	4,723	4,723
U-234	33,274	33,274	32,966	32,966
U-235	40,029	40,029	39,289	39,,289
U-238	40,029	40,029	39,289	39,289
Np-237	80,003	80,003	78,258	78,258
Pu-239	77,757	77,757	75,870	75,870

DOE = U.S. Department of Energy
OSDC = on-site disposal cell
POA = point of assessment
PORTS = Portsmouth Gaseous Diffusion Plant
SRC = site-related contaminant

Table C.4. PORTS Time of Peak Dose for a Potential OSDC at Study Site C

SRC	1,000,000 cy DOE boundary POA	3,000,000 cy DOE boundary POA
Antimony	> 100,000	> 100,000
Arsenic	> 100,000	> 100,000
Barium	> 100,000	> 100,000
Chloroform	7,657	6,864
Chromium III	83,346	83,293
Cyanide	83,527	82,475
1,1-Dichloroethene	2,316	2,309
Methylene Chloride	2,108	2,101
n-Nitroso-di-N-propylamine	4,657	4,636
Aroclor 1232	> 100,000	> 100,000
Trichloroethene	3,205	3,198
Tc-99	24,500	24,400
U-234	> 150,000	> 150,000
U-235	> 150,000	> 150,000
U-238	> 150,000	> 150,000
Np-237	> 150,000	> 150,000
Pu-239	> 150,000	> 150,000

DOE = U.S. Department of Energy
OSDC = on-site disposal cell
POA = point of assessment
PORTS = Portsmouth Gaseous Diffusion Plant
SRC = site-related contaminant

C.4.4.2 PreliminaryAnalytic WAC

Preliminary analytic WAC derived for each study area are based on the POAs descibed above for the 1 million cy and 3 million cy OSDC facilities. As previously discussed, only those constituents modeled to have a peak dose or an appreciable concentration at the POA within 1,000 years have a value for preliminary analytic WAC. Higher or lower WAC values for constituents vary for each study area, however, each study area is similarly protective because they all share the same cell design and performance objectives.

The preliminary analytic WAC for Study Area A is presented in Table C.5. Based on the time of peak dose, only 1,1-dichloroethene, methylene chloride, n-Nitroso-di-N-propylamine, and trichloroethene are shown to have calculated values. The travel times for the other constituents are well beyond 1,000 years.

Table C.5. PORTS Preliminary Analytic WAC Results for Study Area A

	1,000 year time of assessment			
	1,000,000 cy		3,000,000 cy	
SRC	On-site POA (mg/kg or pCi/g)	DOE boundary POA (mg/kg or pCi/g)	On-site POA (mg/kg or pCi/g)	DOE boundary POA (mg/kg or pCi/g)
Antimony				
Arsenic				
Barium				
Chloroform				
Chromium III				
Cyanide				
1,1-Dichloroethene	3.68E+04	1.67E+05	1.57E+03	5.61E+04
Methylene Chloride	1.96E+03	8.67E+03	8.20E+01	2.90E+03
n-Nitroso-di-N-propylamine	3.55E+00	1.96E+01	1.80E-01	6.55E+00
Aroclor 1232				
Trichloroethene	5.15E+03	2.32E+04	2.20E+02	7.80E+03
Tc-99				
U-234				
U-235				
U-238				
Np-237				
Pu-239				

Note: No value shown means no contaminant migration reached the POA.

DOE = U.S. Department of Energy
PORTS = Portsmouth Gaseous Diffusion Plant
OSDC = on-site disposal cell
POA = point of assessment
SRC = site-related contaminant
WAC = waste acceptance criteria

The preliminary analytic WAC for Study Area B are presented in Table C.6. As with Study Area A, only 1,1-dichloroethene, methylene chloride, n-Nitroso-di-N-propylamine, and trichloroethene are shown to have calculated values based on the modeling performed. These results are consistent with other LLW disposal facilities in the eastern United States. Specifically these more mobile constituents are modeled to arrive at the POA within the nominal 1,000-year time of compliance period while most other, less mobile, constituents arrive well after 1,000 years.

Table C.6. PORTS Preliminary Analytic WAC Results for Study Area B

	1,000 year time of assessment			
	1,000,000 cy		3,000,000 cy	
SRC	On-site POA (mg/kg or pCi/g)	DOE boundary POA (mg/kg or pCi/g)	On-site POA (mg/kg or pCi/g)	DOE boundary POA (mg/kg or pCi/g)
Antimony				
Arsenic				
Barium				
Chloroform				
Chromium III				
Cyanide				
1,1-Dichloroethene	8.34E+00	1.31E+06	7.23E-01	4.68E+05
Methylene Chloride	4.81E-01	7.08E+04	6.85E-02	2.42E+04
n-Nitroso-di-N-propylamine	8.32E-04	1.60E+02	5.32E-05	5.48E+01
Aroclor 1232				
Trichloroethene	1.26E+00	1.95E+05	1.18E-01	6.52E+04
Tc-99				
U-234				
U-235				
U-238				
Np-237				
Pu-239				

Note: No value shown means no contaminant migration reached the POA.

DOE = U.S. Department of Energy
PORTS = Portsmouth Gaseous Diffusion Plant
OSDC = on-site disposal cell
POA = point of assessment
SRC = site-related contaminant
WAC = waste acceptance criteria

Finally, Study Area C shows no constituents to arrive at the POA within the 1,000-year time frame. Therefore, under the current modeling analysis, no values are presented for preliminary analytic WAC.

C.4.5 PRELIMINARY ANALYTIC WAC SUMMARY

In summary, development of the preliminary analytic WAC indicates that on-site disposal at the DOE PORTS site is possible. This conclusion is supported by the fate and transport modeling results that illustrate the derived analytic WAC for all radionuclides, and nearly all chemical SRCs are not significantly limited within the time of compliance of 1,000 years.

For Study Areas A and B only, four chemicals have numeric WAC limits within the nominal 1,000-year time of compliance, specifically, 1-1-dichloroethene, methylene chloride, trichloroethene, and n-Nitroso-di-N-propylamine. These SRCs are mostly organic contaminants stemming from the historical use of solvents at the PORTS site. The constituent n-Nitroso-di-N-propylamine is a very weak-bonded chemical that breaks down in sunlight in about 1 day and within a few months in water. It is modeled to peak shortly after 1,000 years, but would begin to breakdown in surface water. Of the radionuclides included in the preliminary analytic WAC modeling, Tc-99 is shown to have the shortest duration to peak dose for all three study sites, although well beyond the 1,000-year time frame (i.e., 4,723–24,500 years). Since doses and risk to the resident-farmer at the points of assessment are limited to protective standards from which analytic WAC within a potential OSDC are back calculated, the receptor(s) are protected. High preliminary analytic WAC limits or no preliminary analytic WAC derived for SRCs indicates that very little or no migration is modeled to occur within the 1,000-year time frame. Thus, contaminated

D&D waste and/or environmental media expected to be generated at PORTS can be safely disposed in a potential OSDC.

For Study Area C, no chemicals or radioisotope SRCs are modeled to reach the receptor POA within the 1,000-year time of compliance, indicating the very slow migration through the thick shale at this study area. Additional analysis of other chemicals and radioisotopes will be evaluated during development of the final analytic WAC.

If considering only the fate and transport (performance-based) modeling results, Study Area C would be the most protective. Study Areas A and B are essentially equal, although Study Area A has slightly higher times of peak dose when considering the property boundary POA only. Thus, all sites can demonstrate with reasonable expectation that LLW disposal performance objectives of DOE Order 435.1 will be satisfied as well as the risk limits for radionuclide and hazardous constituents (i.e., 1×10^{-5} ELCR and HI = 1). Final WAC and a performance assessment of any selected OSDC study area would formally document the conclusion that the LLW performance objectives of DOE Order 435.1 are met.

Additional analyses would be required for the selected OSDC study area before DOE is able to conclude that risk and doses are ALARA. Since dose/risk limits are capped by waste disposal DOE directives and/or regulations, it could be concluded that ALARA levels have been established for the preliminary analytic WAC process. However, additional future studies related to waste form analyses, facility design, and fate and transport modeling necessary for deriving the final analytic WAC may indicate that a WAC for certain SRCs can be increased and a potential OSDC would still meet the performance objectives. Under these circumstances, DOE will consider the benefits of increased WAC as well as ALARA measures to ensure increases are necessary and potential costs (e.g., waste treatment) are justified, otherwise the limits would be maintained at the levels purported in this preliminary analytic WAC.

There is an estimated 1.6 million cy of D&D waste and an additional 600,000 cy of contaminated environmental media at the PORTS site, for a total of 2.2 million cy of waste expected to be generated and requiring disposal capacity in a potential OSDC or at an off-site DOE and/or commercial disposal facility. Sampling and characterization of the buildings, process equipment, and/or environmental media will be completed prior to beginning response action activities. Characterization results to date indicate that for building debris and process equipment, uranium isotopes, technetium, and polychlorinated biphenyls (Aroclors) are the principal SRCs. The calculated preliminary analytic WAC at each study area for these key D&D waste SRCs are not limited. Therefore, it can be assumed from an analytical WAC perspective that all 1.6 million cy of D&D waste could be disposed in a potential OSDC. Characterization results to date for contaminated environmental media indicate that trichloroethene, uranium isotopes, and technetium are the principal SRCs (DOE 1995). The calculated preliminary analytic WAC at each study area for these key environmental media SRCs is not limited within the 1000-year time of compliance period, except for trichloroethene at Study Areas A and B. Study Area B would be limiting for trichloroethene in environmental media (when considering the on-site POA sensitivity case), however, this is not the case for either Study Areas A or C. Therefore, it can be assumed from an analytical WAC perspective that nearly all 600,000 cy of contaminated media waste could be disposed in a potential OSDC. Evaluation of all SRCs against the final analytical WAC, and other physical, administrative, and safety-basis WAC, may result in limitations to contaminated D&D and environmental media waste streams, effectively reducing the expected volume of waste allowable for disposal in a potential OSDC.

One of the stated purposes for developing preliminary analytic WAC is to assess the cost effectiveness of the on-site versus off-site alternatives based on the lower-range volumes estimates. Since, in general, the derived preliminary analytic WAC for key SRCs are not limiting, it is reasonable to conclude that most, if

not all, of the D&D and environmental media waste could be disposed in a potential OSDC. In the PER (DOE 2010), the relative cost of on-site disposal versus off-site disposal is described. The assumed life-cycle cost derived from existing operating cells for on-site disposal is approximately $170 per cy. The cost for off-site disposal generally ranges between $600 and $1,000 per cy, depending on disposal volumes, mode of transportation (i.e., truck, rail), and other factors. Using the lower range of the off-site disposal unit cost (i.e., $600 per cy) and a conservatively high on-site disposal rate of $200 per cy, the cost savings for an on-site disposal facility on a unit rate basis would be $400 per cy and for the estimated 2.2 million cy of contaminated D&D and environmental media waste the total cost savings could be approximately $880 million.

Development of waste disposal facility analytical WAC is an iterative process. To the extent practical, the preliminary analytical WAC utilized as much existing PORTS site-specific information, readily available fate and transport models, and contaminant-specific information as possible. There are opportunities to increase certainty in the preliminary analytic WAC calculations as well as hydrogeological parameters of the study areas in general. Field studies described in this RI/FS Work Plan will be performed during Fiscal Year 2011. Additional empirical site-specific information will be evaluated to possibly substitute for default or literature values as appropriate. Further, DOE is also evaluating the use of additional or alternative modeling tools, such as RESRAD (ANL 1992), for the final analytic WAC process to supplement the analytical processing capability of the analytical tools used for the preliminary analytical WAC and to independently verify the validity of the preliminary analytic WAC results.

C.4.6 FINAL ANALYTIC WAC EVALUATIONS

Final analytic WAC may be consistent with the preliminary analytic WAC or may be adjusted based on stakeholder input. This future work may include the following:

- Future analyses could assess time-dependent release of contaminants to remove the conservative nature of the collective cumulative impact to the hypothetical resident farmer receptor from all the compounds modeled to peak at different times (i.e., sometimes thousands of years apart), yet assumed to cumulatively impact (i.e., dose) a receptor. WAC can be developed by considering the expected exposure period of these compounds. Short (< 100 years), medium (100-1,000 years), and long (> 1,000 years) periods can be used to group the compounds to derive period cumulative WAC for the candidate study areas.

- Preliminary WAC development literature or default values for the PORTS site are used in many cases. Site-specific K_d values for specific constituents and PORTS site actual conditions will be developed based on field studies undertaken as part of the RI/FS Work Plan and used in the final WAC development.

- Model selection, verification, and calibration will be performed during the RI/FS as the analytic WAC models are refined for the final candidate site, if selected. Data are being collected to support this refinement.

- A benchmarking test using other risk model codes (such as RESRAD) may be performed for selected key radionuclides to evaluate model consistency and predictability. This will increase confidence in the results of the risk model.

- A deterministic approach was used to develop the preliminary analytic WAC. For the final analytic WAC, probabilistic modeling approaches can be used.

During the Sitewide Waste Disposition Evaluation RI/FS and in conjunction with the preliminary design effort for a potential OSDC, other models for determining analytic WAC will be evaluated with the pros and cons of each presented to the regulators and, if appropriate, to the public. Through this effort, final models for calculating constituent travel time and analytic WAC will be selected in accordance with the *Work Plan for Modeling Analysis in Support of Regulatory Decisions at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE/PPPO/03-0253). Additionally, model input parameters will be identified and presented to interested parties with appropriate validation and verification performed. A synopsis is presented in Table C.7 of possible models that have been previously used throughout the DOE complex and at other EPA sites, which forms an initial list of models to guide future discussion.

Table C.7. Potential Model Codes for Developing Final Analytic WAC for a Potential PORTS OSDC

Process	Source/vadose (unsaturated zone)	Groundwater
Flow	HELP – Quasi-two-dimensional deterministic, water-routing model for determining water balances. HELP was developed by the U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, for the EPA Risk Reduction Engineering Laboratory, Cincinnati, OH.	MODFLOW/MODPATH – Modular, block-centered finite-difference groundwater flow code developed by the USGS. MODPATH is a three-dimensional particle tracking post-processing program designed for use with output from steady-state simulations of MODFLOW.
Fate-transport	SESOIL – One-dimensional vertical transport screening-level model for the unsaturated (vadose) zone that simulates RNA based on diffusion, adsorption, volatilization, biodegradation, cation exchange, and hydrolysis. SESOIL was developed for the EPA by Bonazountas and Wagner at Arthur D. Little, Inc.	MT3D – Three-dimensional numerical simulation code that models the fate and transport of dissolved contaminants in saturated groundwater systems. MT3D was developed by Chunmiao Zheng at S.S. Papadopulos & Associates, Inc. with partial support from EPA.
Risk/dose analytical model	RESRAD – Computer code designed to calculate site-specific residual radioactive material guidelines, radiation dose, and excess cancer risk to receptors. It was developed by DOE's Argonne National Laboratory and has undergone extensive review, benchmarking, verification, and validation.	
PATHRAE	PATHRAE – Computer code capable of assessing multiple transport pathways for hazardous/ radiological contaminants that have the potential to impact human receptors. PATHRAE-HAZ/RAD was originally developed for EPA (PATHRAE-EPA) to use in preparation of standards for management of LLW.	

DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
HELP = Hydrologic Evaluation of Landfill Performance
LLW = low-level (radioactive) waste
OSDC = on-site disposal cell
PORTS = Portsmouth Gaseous Diffusion Plant
RNA = remediation by natural attenuation
USGS = U.S. Geological Survey
WAC = waste acceptance criteria

C.4.7 SENSITIVITY ANALYSIS

Sensitivity analysis is a technique for systematically changing parameters in a model to determine the effects of such changes on the modeling output. Because analytic WAC modeling involves mathematical models aimed at characterizing the process being investigated (i.e., establishing upper limits of

contaminant concentrations in waste that are protective of human health), the understanding of how the model behaves in response to changes in its inputs is important to ensure correct use of the models. The purpose of sensitivity analysis includes the following:

- Supporting decision making by testing the robustness of the results
- Enhancing credibility of modeling results by understanding the relationships between input and output variables in the model
- Aiding in the development and/or refinement of models by identifying and correcting potential errors.

During development of the final WAC for a potential OSDC in subsequent documents, DOE will perform more in-depth sensitivity analyses to further understand the conservatism or potential vulnerabilities associated with the assumptions used to derive the preliminary analytic WAC.

Specific sensitivity analyses that may be considered during final PORTS OSDC WAC development include the following:

- The POA used to derive potential OSDC WAC (currently at the PORTS site property boundary) may be moved to other locations downgradient and closer to the OSDC. These include a location closer to the potential OSDC footprint (e.g., 100 meters from the potential OSDC) as well as a location at the potential OSDC waste boundary. Intuitively, movement of the POA closer to the OSDC would decrease the WAC for some chemicals and radioisotopes, but the location of the POA will likely not affect the WAC for some constituents.
- In the preliminary analytic WAC, no credit is taken for the HDPE liner beyond the operational life of the facility. HDPE is a man-made robust composite material typically ranging between 40-80 mil in thickness. The use of HDPE liners has been a relatively new technology (10-20 years), so there is minimal in situ performance data to demonstrate its long-term effectiveness. However, laboratory and industry testing has concluded that HDPE degradation is due to the following three primary factors (Bonaparte et al. 2002):
    - Ultra-violet radiation
    - pH extremes (i.e., very high [basic] or very low [acidic])
    - Temperature extreme (i.e., very high).

  None of these three degradation factors are anticipated to exist in a potential OSDC at PORTS. As such, part of the OSDC sensitivity analyses will assume the HDPE layer maintains its impermeable purpose for 100, 500, or approaching 1,000 years.

C.5 SAFETY BASIS WAC

C.5.1 SUMMARY

As part of the development of the DOE facility safety authorization basis for a potential OSDC, an auditable-safety analysis (ASA) and supporting hazard categorization will be developed and will include operational limitations on the releasable inventory of radionuclides that can exist within the facility at any one time. The ASA calculates the total material at risk for release during a bounding-case, off-normal event in terms of cubic yards of a soil-like material that could be released during a hypothesized very high wind event (i.e., a tornado). This volume of material will then be converted to a mass (in grams), and

waste concentrations will be used with this mass to relate the potential releases to the Nuclear Category 3 Threshold Quantities in DOE-STD-1027-92 (DOE 1997). The ASA determines that, with reasonable physical and administrative controls, a potential OSDC can be operated as a radiological facility.

Consistent with the methodology used to develop facility categorization, an ASA-derived WAC will be derived for the various radionuclides that potentially could be accepted in a potential OSDC. These WAC are applied using a sum-of-fractions (SOFs) approach. The ASA-WAC are specifically established to protect potential OSDC workers. If the ASA-derived WAC SOF is < 1, a potential OSDC could maintain its radiological facility categorization without having to alter the normal operating methodologies. If the ASA-derived WAC SOF is ≥ 1, then waste placement operations would have to be altered using ASA-prescribed methods to accommodate the wastes.

C.5.2 ASA RADIOLOGICAL SUM OF FRACTIONS REQUIREMENTS

Generator projects will identify all SRC radionuclides with ASA-derived WAC concentrations known or suspected to be present in the waste lot. For radionuclides present in concentrations > 1 percent of their ASA WAC, the 95th percentile upper confidence limit (UCL95) of the mean will be provided. In cases where UCL95 concentrations exceed the maximum concentrations, the maximums may be used instead. If justified, process knowledge and anecdotal evidence for bounding maximum concentrations may be used in lieu of analytical data. In cases where measurements of gross alpha and gross beta concentrations have been performed and radionuclides with ASA-derived WAC are known or suspected to be present, then the sum total of all alpha-emitting radionuclides (including daughter products in equilibrium) may be subtracted from the gross measurements. The resultant difference is then divided by the most restrictive ASA-derived limit for the known or suspected alpha- or beta-emitting radionuclides without data. The sum of all UCL95 concentrations (or maximums) divided by their WAC is then reported.

In addition, any chemicals with reportable quantities in 40 *CFR* 302.4 that are present in the waste must be identified. For these chemicals, the UCL95 concentrations (or the maximum detected concentration if it is less than the UCL95 for a chemical) are then reported, and a SOF is calculated using the UCL95 of each SRC (unless otherwise noted) in the waste and divided by the ASA limits listed in the final OSDC WAC.

C.6 PHYSICAL WAC

For these physical WAC, requirements in place for disposal cells in Oak Ridge and Fernald were considered. Compliance with physical WAC is necessary to ensure safe and efficient OSDC operations. Physical WAC requirements are operational and detailed in nature and will be finalized as the potential OSDC design and operational plans are developed. The following sections present draft physical WAC to support efficient and safe OSDC operations.

C.6.1 CONTAINER REQUIREMENTS

Describe the containers that are planned. A declarative statement that a WAC will be complied with must be made or a description of any negotiated agreements with the potential OSDC operations subcontractor for any variances must be given. A reference to the section of any waste generation plans that describe compliance with these WAC should also be given.

C.6.2 SIZE REQUIREMENTS

Describe the size and dimensions of waste forms that are planned. A declarative statement that a WAC will be complied with must be made, or a description of any negotiated agreements with the potential

OSDC operations subcontractor for any variances must be given. A reference to the section of any waste generation plans that describe compliance with these WAC should also be given.

C.6.3 WEIGHT REQUIREMENTS

Describe the weight of waste forms that are planned. A declarative statement that a WAC will be complied with must be made, or a description of any negotiated agreements with the potential OSDC operations subcontractor for any variances must be given. A reference to the section of any waste generation plans that describe compliance with these WAC should also be given.

C.6.4 CONCRETE DEBRIS REQUIREMENTS

Describe the physical nature of any concrete debris waste that is planned. A declarative statement that a WAC will be complied with must be made, or a description of any negotiated agreements with the potential OSDC operations subcontractor for any variances must be given. A reference to the section of any waste generation plans that describe compliance with these WAC should also be given.

C.6.5 STEEL PLATE REQUIREMENTS

Describe the physical nature of any steel plate debris waste that is planned. A declarative statement that a WAC will be complied with must be made, or a description of any negotiated agreements with the potential OSDC operations subcontractor for any variances must be given. A reference to the section of any waste generation plans that describe compliance with these WAC should also be given.

C.6.6 PIPE REQUIREMENTS

Describe the physical nature of any pipe debris waste that is planned. A declarative statement that a WAC will be complied with must be made, or a description of any negotiated agreements with the potential OSDC operations subcontractor for any variances must be given. A reference to the section of any waste generation plans that describe compliance with these WAC should also be given.

C.6.7 ASBESTOS- AND BERYLLIUM DUST-CONTAINING WASTE REQUIREMENTS

Describe the packaging that will be used for any asbestos-containing or beryllium-dust-containing waste. Typically, TSCA waste (including asbestos-contaning material) must be double-bagged and wetted prior to disposal. A declarative statement that a WAC will be complied with must be made, or a description of any negotiated agreements with the potential OSDC operations subcontractor for any variances must be given. A reference to the section of any waste generation plans that describe compliance with these WAC should also be given.

C.6.8 CONTAINERIZED COMPACTABLE WASTE

Most PORTS cleanup waste generated is expected to be disposed of in bulk via dump truck or intermodal container. If a drum, B-25 box, or other container of waste is generated, the void spaces will be filled with grout or sand prior to disposal or the container will be crushed and/or cut up by the generator prior to delivery to a potential OSDC.

C.6.9 NONCRUSHABLE CONTAINER REQUIREMENTS

Most PORTS waste generated is expected to be disposed in bulk via dump truck or intermodal container. Non-crushable containers (i.e., B-25 boxes), if generated, will be filled with non-crushable materials (sand or grout) or crushed and/or cut up prior to disposal. Intact containers will be filled at the generator’s site and delivered in compliance with the potential OSDC WAC.

C.6.10 CONTAINER LINER REQUIREMENTS

Waste will be primarily bulk disposed using dump trucks without liners. Liners may be required for unique waste streams and at the discretion of the generator's Transportation Specialist to ensure compliance with U.S. Department of Transportation (DOT) requirements.

C.6.11 DOSE RATE REQUIREMENTS

All unshielded contact dose rates for containers will be well below the DOT and potential OSDC WAC limiting dose rate of 200 mrem per hour on contact. A final DOT survey will document that the containers do not exceed 10 mrem per hour at 2 m from any surface of the container.

C.7 ADMINISTRATIVE WAC

Administrative WAC are derived from ARARs (provided in draft in this RI/FS Work Plan and finalized in the ROD) and from other agreements between DOE and Ohio EPA. All administrative WAC must be met, or appropriate waivers must be obtained and documented for wastes to be disposed in a potential OSDC.

Potential chemical-specific, location-specific, and action-specific Federal and State ARARs and non-promulgated guidance TBC will be developed to apply to waste management activities and waste facility operations. These ARAR lists will be developed based on U.S. EPA and Ohio regulations and applicable guidance and will be similar to the ARARs developed for DOE OSDCs constructed and operated on the DOE Oak Ridge Reservation in Tennessee and the Fernald Environmental Management Project in Ohio. Development of ARARs is an iterative process. Once the remedial alternatives are fully developed in the Sitewide Waste Disposition Evaluation RI/FS, the lists of ARARs and TBCs will be further evaluated (with revisions, additions, and deletions occurring) as they are developed into detailed tables of requirements.

C.8 PRELIMINARY WAC CONCLUSIONS

According to the DFF&O, waste acceptance criteria means, in part, "the criteria developed by Respondent with community input and approved by Ohio EPA which specify standards that must be met by each waste prior to its acceptance into any on-site disposal facility, if such a facility is selected as a remedy pursuant to these Orders." This appendix fulfills a milestone for the Sitewide Waste Disposition Evaluation project.

C.9 REFERENCES

ANL 1992, *User's Manual for RESRAD Version 6,* Argonne National Laboratory, ANL/EAD-4, C. Yu et al., July.

Bonaparte et al. 2002, *Assessment and Recommendations for Improving the Performance of Waste Containment Systems*, R. Bonaparte, R. M. Koerner, and D. E. Daniel, research report published by the U.S. Environmental Protection Agency, National Risk Management Research Laboratory, EPA/600/R-02/099.

DOE 1995a, *Feasibility Study Report for Operable Unit 5*, DOE-1244-95, U.S. Department of Energy, Fernald Area Office, Cincinnati, OH.

DOE 1995b, *Plant-wide Baseline Human Health Risk Assessment, Portsmouth Gaseous Diffusion Plant, Piketon, Ohio,* DOE/OR/11-1403/V1&D1, U.S. Department of Energy, Piketon, OH.

DOE 1995c, *Record of Decision for Remedial Actions at Operable Unit 2, Fernald Environmental Management Project, Fernald, Ohio,* U.S. Department of Energy, May 1995.

DOE 1996, *Plant-Wide Baseline Human Health Risk Assessment, Portsmouth Gaseous Diffusion Plant, Piketon, OH, Volume 1,* DOE/OR/11-1403/V1&D2, U.S. Department of Energy, Piketon, OH, January.

DOE 1998a, *Remedial Investigation and Feasibility Study for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste*, DOE/OR/02-1637&D2, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1998b, *Addendum to Remedial Investigation/Feasibility Study for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste*, DOE/OR/02-1637&D2/A1, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN.

DOE 1999, *Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee*, DOE/OR/01-1791&D3, U.S. Department of Energy, Oak Ridge, TN, November.

DOE 2001, *Radioactive Waste Management*, DOE Order 435.1, Change Notice 1, U.S. Department of Energy, Washington, D.C., February.

DOE 2006, *Cost and Schedule Summary Report, Scenarios I-VI, Draft Final*, U.S. Department of Energy, Piketon, OH, June.

DOE 2010, *Pre-investigation Evaluation Report for the Sitewide Waste Disposition Evaluation Project at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/PPPO/03-0124&D1, U.S. Department of Energy, Piketon, OH, October.

DOE 2011, *Radiation Protection of the Public and Environment*, DOE Order 458.1, U.S. Department of Energy, Washington, D.C., February.

EPA 1991, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part A*, EPA/540/1-89/002, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

Heaton, L.H. 1999, *Water Usage*, ENRI-117, University of Kentucky Cooperative Extension Service, College of Agriculture, Lexington, KY.

Ohio EPA 2002, *Interoffice Communications from T. Christman to M. Galanti, Subject: Feasibility of an On-Site Disposal Cell at X-701B*, January 23, 2002.

Ohio EPA 2010, *Director's Final Findings and Orders for Removal Action and Remedial Investigation and Feasibility Study and Remedial Design and Remedial Action*, Ohio Environmental Protection Agency (Ohio EPA), April 13, 2010.

LPP 2010, *Portsmouth Site-Wide Groundwater Flow Model* (preliminary file only).

McDonald and Harbaugh 1988, *A Modular Three-Dimensional Finite-Difference Groundwater Flow Model*, Book 6, Modeling Techniques, Chapter A1, M.G. McDonald and W. Harbaugh, U.S. Geological Survey, Reston, Virginia.

Pollock 1989, *Documentation of Computer Programs to Compute and Display Pathlines Using Results from the U.S. Geological Survey Modular Three-Dimensional Finite-Difference Groundwater Flow Model*, D. W. Pollock, U.S. Geological Survey Open-file Report 89-381.

Powell et al. 2011a, *Status and Performance of the On-Site Disposal Facility Fernald Preserve, Cincinnati, Ohio*, J. Powell, R. J. Abitz, K. A. Broberg, W. A. Hertel, and F. Johnston, Waste Management 2011 Conference, Phoenix, AZ, February 27-March 3.

Powell et al. 2011b, *Weldon Spring Disposal Cell Performance: The First Ten Years*, J. Powell, V. Kothari, B. Cato, Y. Deyo, R. Thompson, and T. Uhlmeyer, Waste Management 2011 Conference, Phoenix, AZ, February 27-March 3.

Rogers and Associates Engineering 1995a, *The PATHRAE-HAZ/RAD-RAD Performance Assessment Code for the Land Disposal of Radioactive Wastes*, Rogers and Associates Engineering Corporation, RAE-9500/2-1, Salt Lake City, Utah.

Rogers and Associates Engineering 1995b, *The PATHRAE-HAZ/RAD-HAZ Performance Assessment Code for the Land Disposal of Hazardous Chemical Wastes*, Rogers and Associates Engineering Corporation, RAE-9500/2-2, Salt Lake City, Utah.

Rogers and Hung 1987, PATHREA-EPA: *A Low-Level Radioactive Waste Environmental Transport and Risk Assessment Code - Methodology and Users Manual*, EPA 520/1-87-028 (RAE 8706/1-6), V. Rogers and C. Hung, Rogers and Associates, Salt Lake City, Utah, for the U.S. Environmental Protection Agency, Washington, D.C.

Schroeder et al. 1994, *The Hydrologic Evaluation of Landfill Performance (HELP) Model: Engineering Documentation for Version 3*, EPA/600/R-94/168b, September 1994, P.R. Schroeder, T.S. Dozier,

P.A. Zappi, B.M. McEnroe, J.W. Sjostrom, and R.L. Peyton, U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C.

Rowe 2009, "Aging of HDPE Geomembrane Exposed to Air, Water, and Leachate at Different Temperatures," *Geotextiles and Geomembranes*, Vol. 27, No. 2, pp. 137-151.

Yu et al.1993, *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD*, Version 5.0, ANL/EAD/LD-2, C. Yu, A.J. Zielen, J.J. Cheng, Y.C. Yuan, L.G. Jones, D.J. LePoire, Y.U. Wang, C.O. Loureiro, E. Gnanapragasam, E. Faillace, A.Wallo III, W.A. Williams, and H. Peterson, September.

Zheng 1990, *A Modular Three-Dimensional Transport Model for Simulation of Advection, Dispersion and Chemical Reactions of Contaminants in Groundwater Systems*, Chunmiao, Zheng, S.S. Papadopulos & Associates, Inc.

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ATTACHMENT

PORTSMOUTH GASEOUS DIFFUSION PLANT WASTE DISPOSITION EVALUATION PROJECT

POTENTIAL ON-SITE WASTE DISPOSAL FACILITY PRELIMINARY WASTE ACCEPTANCE CRITERIA CALCULATION PACKAGE

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INTRODUCTION

This attachment presents the calculations for development of preliminary analytical waste acceptance criteria (WAC) for a potential on-site disposal cell (OSDC) option at the U.S. Department of Energy (DOE) Ohio Portsmouth Gaseous Diffusion Plant site. For this analysis, three candidate sites for a potential OSDC are considered (see Figure C.1).

As discussed in Section C.3.1 of this Sitewide Waste Disposition Evaluation project RI/FS Work Plan, the receptor scenario used for preliminary analytic WAC development is the hypothetical residential farmer that lives on, or near, the site boundary. Using this exposure scenario, constituent-specific preliminary analytical WAC are determined for each of the candidate sites based on the conceptual design presented using HELP model, MODFLOW, MODPATH, MT3D, and PATHRAE.

HELP MODEL

Table 1 lists the disposal cell profile and properties used for calculating infiltration through the conceptual disposal facility with the HELP model. Table 2 shows the results of HELP analysis. The long-term infiltration rate of 0.4 in. per year is used for subsequent groundwater modeling and PATHRAE modeling and preliminary analytic WAC calculation.

MODFLOW/MODPATH MODELS

Table 1. Long-Term (Worst Case) Scenario for the Waste Disposal Cell

Layer Number	Material Type	Layer Type	Layer Thickness (in.)	Soil Texture Type	Total Porosity (vol/vol)	Field Capacity (vol/vol)	Wilting Point (vol/vol)	Saturated Hydraulic Conductivity (cm/s)	Drainage Length (ft)	Drainage Slope (%)
1	soil/rock matrix	1	60	4	0.437	0.105	0.047	1.70E-03		
2	filter sand	1	12	3	0.457	0.083	0.033	3.10E-03		
3	cobble/gravel/sand	1	36	1	0.417	0.045	0.018	1.00E-02		
4	drainage (gravel)	2	12	21	0.397	0.032	0.013	3.00E-01	100	5
5	clay/GCL liner	3	4.24		0.427	0.418	0.367	3.53E-08		
6	clay barrier	1	36	16	0.427	0.418	0.367	1.00E-07		
7	silty clay-loam	1	24	24	0.365	0.305	0.202	2.70E-06		
8	silty clay	1	12	26	0.445	0.393	0.277	1.90E-06		
9	waste	1	600	22	0.419	0.307	0.180	1.90E-05		
10	silty clay	1	12	26	0.445	0.393	0.277	1.90E-06		
11	drainage (gravel)	1	24	21	0.397	0.032	0.013	3.00E-01		
12	clay/GCL liner	3	4.24		0.427	0.418	0.367	3.53E-08		
13	clay barrier	1	36	16	0.427	0.418	0.367	1.00E-07		
14	geo-buffering layer	1	48	26	0.445	0.393	0.277	1.90E-06		

Table 2. Results of HELP Model Simulation

Average Annual Totals and (Std. Deviations) for Years 1 Through 100				
	Inches		Cubic Feet	Percent
Precipitation	37.09	(4.935)	9156282.0	100.00
Runoff	3.857	(2.0801)	952168.37	10.399
Evapotranspiration	22.539	(2.5559)	5563620.50	60.763
Lateral Drainage Collected from Layer 4	10.28670	(3.13928)	2539168.000	27.73143
Percolation/Leakage through Layer 5	0.42089	(0.00782)	103892.742	1.13466
Average Head on Top of Layer 5	0.033	(0.010)		
Percolation/Leakage through Layer 12	0.41720	(0.03176)	102981.570	1.12471
Average Head on Top of Layer 12	0.005	(0.003)		
Percolation/Leakage through Layer 14	0.41517	(0.03288)	102479.555	1.11923
Change in Water Storage	-0.005	(1.7251)	-1152.24	-0.013

MODFLOW simulations, based on the conceptual disposal cell design and future site conditions, were conducted to predict future groundwater level and flow regime for each study area using the constructed site-specific flow models. Depth to groundwater information was used to conduct vadose zone transport analysis. Preferred groundwater flow paths from the source areas (conceptual OSDC) to the possible exposure points along the surface creek and its tributaries were determined from particle tracking simulation using MODPATH based on MODFLOW simulation results. The particles were placed in the source areas under the proposed waste cells and transported along the dominant hydraulic direction calculated based on the model simulations.

Groundwater travel times along the flow path lines to the exposure points are calculated during the particle-tracking simulations using the groundwater models. Groundwater flux rates and discharge rates to the surface creeks and their segments are calculated based on the MODFLOW results.

MT3D MODEL
The movement of contaminants from the conceptual waste cells to various receptors outside of the waste disposal site in groundwater was simulated by using MT3D. MT3D is linked with the MODFLOW and is designed specifically to handle advectively dominated transport problems without the need to construct refined models specifically for solute transport.

Based on the results of MODLFOW flow simulations for each of the sites, MT3D was used to predict the contaminant concentration distribution near the sites. A constant leaching source from the waste disposal cells to groundwater beneath the facilities was used in the model. This is based on the assumption that a greater mass of contaminants remains in the waste in the disposal facility relative to that quantity being leached. Only the advection process was considered; retardation processes, radioactive decay, and chemical reaction and degradation were ignored. However, these processes are considered in the PATHRAE calculation.

For purpose of risk analysis for the proposed disposal cells, a hypothetical domestic groundwater supply well was placed hydraulically downgradient from the edge of the disposal cell. The well is simulated under a steady state condition for a future (after cell closure) condition. To represent the domestic water supply well with a production of 240 gallon per day, a steady state pumping rate of 0.167 gpm was used. The time-dependent contaminant concentration withdrawn from the well is estimated as a relative concentration, assuming that the concentration of the contaminant seeping from the vadose zone into

groundwater beneath the disposal cell is unity. Accordingly, the model estimates a fraction of the contaminant that is transported to the well location and being captured.

PATHRAE MODEL

Using the input parameters generated from supporting models and site-specific data, the PATHRAE-RAD and PATHRAE-HAZ models are used to develop preliminary analytic WAC. The PATHRAE analyses are conducted for the points of assessment of the three sites as discussed in Appendix C.

Input parameters used to conduct the PATHRAE analysis are summarized in Table 3.

Table 3. Input Parameters for PATHRAE

Parameters	Unit	Site B - 1 million	Site B - 3 million	Site A - 1 million	Site A - 3 million	Site C - 1 million	Site C - 3 million
waste cell length (N-S)	meter	162	305	389	672	354.3	609.6
waste cell width (E-W)	meter	311	494	130	224	141.7	243.8
waste thickness	meter	15.2	15.2	15.2	15.2	15.2	15.2
waste volume	cubic yard	1000000	3000000	1000000	3000000	1000000	3000000
waste density	kg/m^3	1600	1600	1600	1600	1600	1600
cover thickness	meter	4	4	4	4	4	4
amount of water percolating through waste	inch	0.4	0.4	0.4	0.4	0.4	0.4
bulk soil density	kg/m^3	1600	1600	1600	1600	1600	1600
vadose zone porosity	unitless	0.3	0.3	0.3	0.3	0.3	0.3
depth of watertable	ft	20	20	25	25	105	105
aquifer density	kg/m^3	1800	1800	1800	1800	1800	1800
aquifer porosity	unitless	0.3	0.3	0.3	0.3	0.3	0.3
longitudinal dispersivity in aquifer	meter	1.83	1.83	1.83	1.83	1.83	1.83
transverse dispersion coefficient in aquifer	meter	0	0	0	0	0	0
distance from nearest edge of waste to river	Meter	658	500	447	305	NA	NA
stream flow rate	cfs	6.7	6.7	0.8	0.8	NA	NA
well dilution Factor ($C_{water}/C_{leachate}$)	unitless	0.0542	0.127	0.00001	0.0001	0.037	0.067

NA - not applicable

The K_d values for the various zones used for the PATHRAE modeling for the site-related constituents (SRCs) at PORTS are listed in Table 4.

Table 4. K_d Used in PATHRAE

SRC	K_d Waste[1] (ml/g)	K_d Vadose Zone[1] (ml/g)	K_d Aquifer Zone[1] (ml/g)
Antimony	19	19	1.9
Arsenic	29	19	1.9
Barium	55	55	5.5
Chloroform	0.62	0.62	0.062
Chromium III	10	10	1
Cyanide	9.9	9.9	0.99
1,1-Dichloroethene	0.0636	0.0636	0.00636
Methylene Chloride	0.0434	0.0434	0.00434
Nitroso-di-N-propylamine	0.3	0.3	0.03
Aroclor 1232	16.8	16.8	1.68
Trichloroethene	0.121	0.121	0.0121
Tc-99	3	3	0
U-234	40	20	7
U-235	40	20	7
U-238	40	20	7
Np-237	56	40	40
Pu-239	58	40	40

K_d = distribution coefficient
SRC = site-related contaminant
[1] K_c values from DOE 1998a except for Tc-99, which is from Ohio EPA 2002.

PATHRAE calculates the arrival and peak time for the contaminant at surface water locations. The peak times for the sites are listed in Table 5. For the contaminants that are modeled to either peak or have a concentration within the 1000-year time frame, the maximum concentrations in the creek are used to conduct risk and dose calculations as described in the next section.

Table 5. PORTS Time of Peak Dose for an OSDC

	1,000,000 cy		3,000,000 cy	
	On-site POA (years)	DOE Boundary POA (years)	On-site POA (years)	DOE Boundary POA (years)
Study Site A				
Antimony	44,133	44,133	44,039	44,039
Arsenic	44,133	44,133	44,039	44,039
Barium	126,981	126,981	126,724	126,724
Chloroform	2,200	2,200	1,823	1,823
Chromium III	23,420	23,420	23,367	23,367
Cyanide	23,190	23,190	23,138	23,138
1,1-Dichloroethene	664	664	654	654
Methylene Chloride	608	608	599	599
Nitroso-di-N-propylamine	1,316	1,316	1,306	1,306
Aroclor 1232	39,070	39,070	38,986	38,986
Trichloroethene	822	822	812	812
Tc-99	5,846	5,846	5,845	5,845
U-234	38,812	38,812	39,076	39,076
U-235	47,202	47,202	46,876	46,876

Table 5. PORTS Time of Peak Dose for an OSDC (Continued)

	1,000,000 cy		3,000,000 cy	
	On-site POA (years)	**DOE Boundary POA (years)**	**On-site POA (years)**	**DOE Boundary POA (years)**
U-238	47,202	47,202	46,876	46,876
Np-237	84,517	84,517	85,950	85,950
Pu-239	83,170	83,170	84,512	84,512
Study Site B				
Antimony	35,960	35,960	35,746	35,746
Arsenic	35,960	35,960	35,746	35,746
Barium	103,379	103,379	102,793	102,793
Chloroform	1,847	1,847	1,819	1,819
Chromium III	19,106	19,106	18,985	18,985
Cyanide	18,918	18,918	18,799	18,799
1,1-Dichloroethene	497	497	479	479
Methylene Chloride	551	551	442	442
Nitroso-di-N-propylamine	1,128	1,128	1,103	1,103
Aroclor 1232	31,840	31,840	31,649	31,649
Trichloroethene	726	726	703	703
Tc-99	4,728	4,728	4,723	4723
U-234	33,274	33,274	32,966	32,966
U-235	40,029	40,029	39,289	39,289
U-238	40,029	40,029	39,289	39,289
Np-237	80,003	80,003	78,258	78,258
Pu-239	77,757	77,757	75,870	75,870
Study Site C				
Antimony		> 100,000		> 100,000
Arsenic		> 100,000		> 100,000
Barium		> 100,000		> 100,000
Chloroform		7,657		6,864
Chromium III		83,346		83,293
Cyanide		83,527		82,475
1,1-Dichloroethene		2,316		2,309
Methylene Chloride		2,108		2,101
Nitroso-di-N-propylamine		4,657		4,636
Aroclor 1232		> 100,000		> 100,000
Trichloroethene		3,205		3,198
Tc-99		24,500		24,400
U-234		> 150,000		> 150,000
U-235		> 150,000		> 150,000
U-238		> 150,000		> 150,000
Np-237		> 150,000		> 150,000
Pu-239		> 150,000		> 150,000

DOE = U.S. Department of Energy
POA = point of assessment
PORTS = Portsmouth Gaseous Diffusion Plant
OSDC = on-site disposal cell
WAC = waste acceptance criteria

Due to the larger number of PATHARE-RAD and PATHRAE-HAZ model runs conducted for the list of SRCs for the several points of assessment (POAs) for the three sites, and for two volume scenarios for

each site, only one set of PATHARE-RAD and PATHRAE-HAZ output files for a single POA associated with only one site are included in this calculation package as an example (see PATHRAE Model Input/output Files). Other PATHRAE model run files, both text output and electronic versions, are available upon request.

METHOD OF RISK AND DOSE ASSESSMENT

The projected peak risks and doses from radioactive or hazardous constituents in the first nominal 1,000 years after closure were calculated for the exposure pathways discussed in Appendix C, assuming a concentration of contaminants in the waste (source term) of 1 Ci/m^3 (curie per cubic meter) for radioactive constituents and 1 kg/m^3 (kilogram per cubic meter) for non-radioactive constituents, respectively.

The calculations were performed in the following steps:

1. PATHRAE calculations were performed to determine the equivalent annual water consumption per year for the creek (defined as the Equivalent Uptake [EU]). This equivalent uptake water consumption is derived by scaling the use of creek water for drinking and agricultural purposes to an equivalent annual drinking water ingestion that would give the same annual constituent uptake as calculated to come from all water-based pathways. Because drinking water in the resident farmer exposure scenario will be supplied by a well rather than the creek, the annual drinking water volume of 730 l/yr to be supplied by the well is subtracted from the creek EU to estimate the effective drinking water ingestion that can be associated with agricultural uses for the creek surface water. The PATHRAE calculations also provide peak concentrations of contaminants in the creek water corresponding to a unit source term, the corresponding peak doses or risks associated with those concentrations, and the times of occurrence of the peak concentrations.

2. The calculated dilution factors (DFs) for the creek and the residential well were used for scaling the constituent concentrations in the creek to corresponding well concentrations.

   The DFs calculations are carried out in the following steps:

   - For each pumping well location and well scenario (screening depth, etc.) for each site, a groundwater flow simulation run using MODFLOW was performed to determine the specific groundwater flow field.

   - Contaminant movement in the resultant flow field with time for a unit seepage for each disposal cell scenario was simulated with MT3D. After a steady state was achieved for the contaminant plume, the concentration field was established.

   - For the pumping scenarios, a well concentration versus time graph was plotted to show the concentration change with pumping at the well location. The steady state well concentration (maximum concentration) obtained while pumping was then compared (i.e., ratioed) to a unit seepage from the disposal cell to obtain a well dilution factor DF_{well} = steady-state pumped concentration in the well/unit concentration seeping from the disposal cell.

   - The surface water dilution factor $DF_{surface\ water}$ = PATHRAE modeled concentration in the surface water due to a unit seepage from the disposal cell × surface water flow rate/unit concentration seeping from disposal cell.

- Therefore, the modeled contaminant concentration in the well due to a unit waste concentration is then calculated $C_{well} = DF_{well}/DF_{surface\ water} \times C_{surface\ water}$ (PATHRAE modeled contaminant concentration in the surface water).

3. The peak effective dose was calculated as the dose due to ingestion of 730 l/yr per year of water drawn from the well, plus the consumption of agricultural products and livestock irrigated or watered with the creek surface water. The latter is calculated by subtracting 730 l/yr of water from the EU for the creek water that is calculated by the PATHRAE computer code. Thus:

$$\textit{Peak Effective Dose} = $$
$$\textit{Peak Creek Dose} \times [EU\text{-}730 + (DF_{Well}/DF_{Creek}) \times 730]/EU$$

where:

DF_{Well} and DF_{Creek} are the dilution factors calculated for the well and creek, respectively.
Peak creek risk or dose corresponds to ingestion of the creek water at the annual EU rate.

1.1.1.1 Radioactive Constituents – Risk

The Peak Creek Risk for radioactive constituents is:

Peak Creek Risk = Peak creek concentration × EU × Slope Factor × 30 years exposure duration,

where:

Peak creek risk was calculated directly by the PATHRAE-RAD computer code using slope factors (Excess Lifetime Cancer Risk [ELCR]/pCi) obtained from the U.S. Environmental Protection Agency Health Effects Assessment Summary tables.

1.1.1.2 Hazardous Constituents – Risk and Dose

Peak Creek Risk = Peak creek lifetime intake of carcinogens × slope factor

Peak Creek Lifetime Intake for Carcinogens = Peak Creek Concentration × EU × 30 years exposure duration / [70 kg body weight × 365 days per year × 70 year life]

and

Peak Creek Daily Intake (Dose) for Non-Carcinogens = Peak creek concentration × EU/ [70 kg body weight × 365 days per year],

where:

Peak creek daily intake for non-carcinogens was calculated using PATHRAE-HAZ generated data and the formula immediately above.

The peak risks and doses calculated from the PATHRAE code for the study areas are based on a unit source term of 1 Ci/m^3 for radionuclides and 1 kg/m^3 for hazardous constituents (non-radionuclides).

The following risk and hazard index criteria established for a disposal facility are then used to scale the WAC values calculated from PATHRAE:

- Excess lifetime cancer risk (ELCR) of 1×10^{-5} for 1,000 years post-closure and
- Hazard index (HI) of 1 for 1,000 years post-closure.

For radioactive constituents:

$$WACl = 6.25 \times 10^{5} * ELCR / [Peak\ Effective\ Risk\ from\ a\ 1\ Ci/m^{3}\ source]$$

where:

WAC are expressed in picocuries per gram (pCi/g) and the factor 6.25×10^{5} results from unit conversions.

For carcinogenic hazardous constituents:

$$WAC = 625 * ELCR / [Peak\ Effective\ Risk\ from\ a\ 1\ kg/m^{3}\ source]$$

For non-carcinogenic hazardous constituents:

$$WAC = 625 * HI / [Peak\ Effective\ Dose\ from\ 1\ kg/m^{3}\ source / Reference\ Dose]$$

where:

WAC are expressed in milligrams per kilogram (mg/kg) and the factor of 625 comes from unit conversions.

The peak risks and doses calculated using the PATHRAE code for the sites, based on unit source terms, are given in Table 6 for the constituents.

All the preliminary WAC calculated for the points of assessment for each site considered are summarized in Table 7.

Table 6. Peak Effective Risks and Doses for an OSDC for Hazardous Constituents (Based on a 1 kg/m^3 Concentration in the Waste)

Constituent	Peak Dose in Creek (mg/kg-day)	Peak Concentration in Creek (mg/L)	Reference Dose (mg/kg-day)	Equivalent Uptake (L/yr)	Slope Factor (1/mg/kg-d)	Peak Effective Risk (ILCR)	Peak Effective Dose (mg/kg-day)
Site B -1 million on site							
Antimony	7.86E-05	2.74E-03	4.00E-04	7.33E+02	0.00E+00	0.00E+00	4.86E-02
Arsenic	5.24E-05	1.80E-03	5.24E-05	7.43E+02	1.50E+00	2.05E-02	3.20E-02
Barium	2.75E-05	9.52E-04	9.52E-04	7.37E+02	0.00E+00	0.00E+00	1.69E-02
Chloroform	1.87E-03	6.51E-02	1.00E-02	7.33E+02	6.10E-03	3.02E-03	1.16E+00
Chromium III	1.57E-04	5.16E-03	1.00E+00	7.79E+02	0.00E+00	0.00E+00	9.14E-02
Cyanide	1.49E-04	5.21E-03	2.00E-02	7.33E+02	0.00E+00	0.00E+00	9.22E-02
1,1-Dichloroethylene	5.43E-03	1.89E-01	5.00E-02	7.33E+02	0.00E+00	0.00E+00	3.36E+00
Methylene Choride	6.53E-03	2.28E-01	6.00E-02	7.33E+02	7.50E-03	1.30E-02	4.04E+00
n-Nitroso-di-N-propyl amine	3.09E-03	1.08E-01		7.33E+02	7.00E+00	5.75E+00	1.91E+00
Arclor-1232	3.53E-06	1.22E-04	2.00E+00	8.35E+02	0.00E+00	0.00E+00	1.92E-03
Trichloroethene	3.09E-03	1.08E-01		7.33E+02	5.90E-03	4.85E-03	1.91E+00
Site B -1 million off site							
Antimony	7.86E-05	2.74E-03	4.00E-04	7.33E+02	0.00E+00	0.00E+00	3.22E-07
Arsenic	2.76E-03	1.80E-03	5.24E-05	7.43E+02	1.50E+00	5.89E-07	4.83E-05
Barium	1.45E-03	9.52E-04	9.52E-04	7.37E+02	0.00E+00	0.00E+00	1.38E-05
Chloroform	1.87E-03	6.51E-02	1.00E-02	7.33E+02	6.10E-03	2.00E-08	7.65E-06
Chromium III	1.57E-04	5.16E-03	1.00E+00	7.79E+02	0.00E+00	0.00E+00	9.88E-06
Cyanide	1.49E-04	5.21E-03	2.00E-02	7.33E+02	0.00E+00	0.00E+00	6.10E-07
1,1-Dichloroethylene	5.84E-03	1.89E-01	5.00E-02	7.33E+02	0.00E+00	0.00E+00	2.39E-05
Methylene Choride	6.53E-03	2.34E-01	6.00E-02	7.33E+02	7.50E-03	8.83E-08	2.67E-05
n-Nitroso-di-N-propyl amine	3.09E-03	1.11E-01		7.33E+02	7.00E+00	3.91E-05	1.26E-05
Arclor-1232	3.53E-06	1.22E-04	2.00E+00	8.35E+02	0.00E+00	0.00E+00	4.44E-07
Trichloroethene	3.09E-03	1.08E-01		7.33E+02	5.90E-03	3.21E-08	1.26E-05
Site B -3 million on site							
Antimony	2.36E-04	8.22E-03	4.00E-04	7.33E+02	0.00E+00	0.00E+00	3.42E-01
Arsenic	1.57E-04	5.41E-03	5.24E-05	7.43E+02	1.50E+00	1.45E-01	2.24E-01
Barium	8.25E-05	2.86E-03	9.52E-04	7.37E+02	0.00E+00	0.00E+00	1.19E-01
Chloroform	5.61E-03	1.95E-01	1.00E-02	7.33E+02	6.10E-03	2.12E-02	8.13E+00
Chromium III	4.72E-04	1.55E-02	1.00E+00	7.79E+02	0.00E+00	0.00E+00	6.44E-01
Cyanide	4.49E-04	1.56E-02	2.00E-02	7.33E+02	0.00E+00	0.00E+00	6.51E-01
1,1-Dichloroethylene	1.63E-02	5.67E-01	5.00E-02	7.33E+02	0.00E+00	0.00E+00	2.36E+01
Methylene Choride	1.96E-02	6.83E-01	6.00E-02	7.33E+02	7.50E-03	9.13E-02	2.84E+01
n-Nitroso-di-N-propyl amine	9.29E-03	3.24E-01		7.33E+02	7.00E+00	4.04E+01	1.35E+01
Trichloroethene	9.26E-03	3.23E-01		7.33E+02	5.90E-03	3.40E-02	1.34E+01
Site B -3 million off site							
Antimony	2.36E-04	8.22E-03	4.00E-04	7.33E+02	0.00E+00	0.00E+00	9.66E-07
Arsenic	1.57E-04	5.41E-03	5.24E-05	7.43E+02	1.50E+00	1.77E-06	2.75E-06
Barium	8.25E-05	2.86E-03	9.52E-04	7.37E+02	0.00E+00	0.00E+00	7.84E-07
Chloroform	5.61E-03	1.95E-01	1.00E-02	7.33E+02	6.10E-03	5.99E-08	2.30E-05
Chromium III	4.72E-04	1.55E-02	1.00E+00	7.79E+02	0.00E+00	0.00E+00	2.97E-05
Cyanide	4.49E-04	1.56E-02	2.00E-02	7.33E+02	0.00E+00	0.00E+00	1.84E-06
1,1-Dichloroethylene	1.63E-02	5.67E-01	5.00E-02	7.33E+02	0.00E+00	0.00E+00	6.67E-05
Methylene Choride	1.96E-02	6.83E-01	6.00E-02	7.33E+02	7.50E-03	2.58E-07	8.02E-05
n-Nitroso-di-N-propyl amine	9.29E-03	3.24E-01		7.33E+02	7.00E+00	1.14E-04	3.80E-05
Arclor-1232	1.06E-05	3.66E-04	2.00E+00	8.35E+02	0.00E+00	0.00E+00	1.33E-06
Trichloroethene	9.26E-03	3.23E-01		7.33E+02	5.90E-03	9.59E-08	3.79E-05
Site A -1 million on site							
Antimony	6.59E-04	2.30E-02	4.00E-04	7.33E+02	0.00E+00	0.00E+00	1.20E-05
Arsenic	4.39E-04	1.51E-02	5.24E-05	7.43E+02	1.50E+00	8.85E-06	1.38E-05
Barium	2.30E-04	7.98E-03	9.52E-04	7.37E+02	0.00E+00	0.00E+00	5.40E-06
Chloroform	1.56E-02	5.46E-01	1.00E-02	7.33E+02	6.10E-03	7.43E-07	2.83E-04
Chromium III	1.32E-03	4.32E-02	1.00E+00	7.79E+02	0.00E+00	0.00E+00	1.00E-04
Cyanide	1.25E-03	4.37E-02	2.00E-02	7.33E+02	0.00E+00	0.00E+00	2.27E-05
1,1-Dichloroethylene	4.57E-02	1.59E+00	5.00E-02	7.33E+02	0.00E+00	0.00E+00	8.29E-04
Methylene Choride	5.47E-02	1.91E+00	6.00E-02	7.33E+02	7.50E-03	3.19E-06	9.92E-04
n-Nitroso-di-N-propyl amine	2.59E-02	9.04E-01		7.33E+02	7.00E+00	1.41E-03	4.70E-04
Arclor-1232	2.97E-05	1.03E-03	2.00E+00	8.35E+02	0.00E+00	0.00E+00	4.10E-06
Trichloroethene	2.60E-02	9.07E-01		7.33E+02	5.90E-03	1.19E-06	4.72E-04
Site A -1 million off site							
Antimony	6.59E-04	2.30E-02	4.00E-04	7.33E+02	0.00E+00	0.00E+00	2.70E-06
Arsenic	4.39E-04	1.51E-02	5.24E-05	7.43E+02	1.50E+00	4.94E-06	7.68E-06
Barium	2.30E-04	7.98E-03	9.52E-04	7.37E+02	0.00E+00	0.00E+00	2.18E-06
Chloroform	1.56E-02	5.46E-01	1.00E-02	7.33E+02	6.10E-03	1.68E-07	6.38E-05
Cyanide	1.25E-03	4.37E-02	2.00E-02	7.33E+02	0.00E+00	0.00E+00	5.12E-06
1,1-Dichloroethylene	4.57E-02	1.59E+00	5.00E-02	7.33E+02	0.00E+00	0.00E+00	1.87E-04
Methylene Choride	5.47E-02	1.91E+00	6.00E-02	7.33E+02	7.50E-03	7.21E-07	2.24E-04
n-Nitroso-di-N-propyl amine	2.59E-02	9.04E-01		7.33E+02	7.00E+00	3.18E-04	1.06E-04
Arclor- 1232	2.97E-05	1.03E-03	2.00E+00	8.35E+02	0.00E+00	0.00E+00	3.73E-06
Trichloroethene	2.60E-02	9.07E-01		7.33E+02	5.90E-03	2.69E-07	1.06E-04

Table 6. Peak Effective Risks and Doses for an OSDC for Hazardous (Based on a 1 kg/m^3 Concentration in the Waste) (continued)

Constituent	Peak Dose in Creek (mg/kg-day)	Peak Concentration in Creek (mg/L)	Reference Dose (mg/kg-day)	Equivalent Uptake (L/yr)	Slope Factor (1/mg/kg-d)	Peak Effective Risk (ILCR)	Peak Effective Dose (mg/kg-day)
Site A -3 million on site							
Antimony	1.98E-03	6.89E-02	4.00E-04	7.33E+02	0.00E+00	0.00E+00	2.86E-04
Arsenic	1.32E-03	4.53E-02	5.24E-05	7.43E+02	1.50E+00	1.32E-04	2.06E-04
Barium	6.91E-04	2.39E-02	9.52E-04	7.37E+02	0.00E+00	0.00E+00	1.03E-04
Chloroform	4.69E-02	1.64E+00	1.00E-02	7.33E+02	6.10E-03	1.78E-05	6.78E-03
Chromium III	3.95E-03	1.30E-01	1.00E+00	7.79E+02	0.00E+00	0.00E+00	7.70E-04
Cyanide	3.76E-03	1.31E-01	2.00E-02	7.33E+02	0.00E+00	0.00E+00	5.43E-04
1,1-Dichloroethylene	1.36E-01	4.74E+00	5.00E-02	7.33E+02	0.00E+00	0.00E+00	1.97E-02
Methylene Choride	1.64E-01	5.72E+00	6.00E-02	7.33E+02	7.50E-03	7.62E-05	2.37E-02
n-Nitroso-di-N-propyl amine	7.78E-02	2.71E+00		7.33E+02	7.00E+00	3.37E-02	1.12E-02
Arclor-1232	8.84E-05	3.06E-03	2.00E+00	8.35E+02	0.00E+00	0.00E+00	2.20E-05
Trichloroethene	7.74E-02	2.70E+00		7.33E+02	5.90E-03	2.83E-05	1.12E-02
Site A -3 million off site							
Antimony	1.98E-03	6.89E-02	4.00E-04	7.33E+02	0.00E+00	0.00E+00	8.10E-06
Arsenic	1.32E-03	4.53E-02	5.24E-05	7.43E+02	1.50E+00	1.48E-05	2.31E-05
Barium	6.91E-04	2.39E-02	9.52E-04	7.37E+02	0.00E+00	0.00E+00	6.56E-06
Chloroform	4.69E-02	1.64E+00	1.00E-02	7.33E+02	6.10E-03	5.03E-07	1.92E-04
Chromium III	3.95E-03	1.30E-01	1.00E+00	7.79E+02	0.00E+00	0.00E+00	2.48E-04
Cyanide	3.76E-03	1.31E-01	2.00E-02	7.33E+02	0.00E+00	0.00E+00	1.54E-05
1,1-Dichloroethylene	1.36E-01	4.74E+00	5.00E-02	7.33E+02	0.00E+00	0.00E+00	5.57E-04
Methylene Choride	1.64E-01	5.72E+00	6.00E-02	7.33E+02	7.50E-03	2.16E-06	6.71E-04
n-Nitroso-di-N-propyl amine	7.78E-02	2.71E+00		7.33E+02	7.00E+00	9.55E-04	3.18E-04
Arclor-1232	8.84E-05	3.06E-03	2.00E+00	8.35E+02	0.00E+00	0.00E+00	1.11E-05
Trichloroethene	7.74E-02	2.70E+00		7.33E+02	5.90E-03	8.02E-07	3.17E-04

ILCR =

Table 7. PORTS Preliminary Analytic WAC Results for an OSDC

	1,000 Year Time of Assessment			
	1,000,000 cy		3,000,000 cy	
Constituent	On-site POA (mg/kg or pCi/g)	DOE Boundary POA (mg/kg or pCi/g)	On-site POA (mg/kg or pCi/g)	DOE Boundary POA (mg/kg or pCi/g)
Study Site A				
Antimony	--	--	--	--
Arsenic	--	--	--	--
Barium	--	--	--	--
Chloroform	--	--	--	--
Chromium III	--	--	--	--
Cyanide	--	--	--	--
1,1-Dichloroethene	3.68E+04	1.67E+05	1.57E+03	5.61E+04
Methylene Chloride	1.96E+03	8.67E+03	8.20E+01	2.90E+03
Nitroso-di-N-propylamine	3.55E+00	1.96E+01	1.80E-01	6.55E+00
Aroclor 1232				
Trichloroethene	5.15E+03	2.32E+04	2.20E+02	7.80E+03
Tc-99	--	--	--	--
U-234	--	--	--	--
U-235	--	--	--	--
U-238	--	--	--	--
Np-237	--	--	--	--
Pu-239	--	--	--	--
Study Site B				
Antimony	--	--	--	--
Arsenic	--	--	--	--
Barium	--	--	--	--
Chloroform	--	--	--	--
Chromium III	--	--	--	--
Cyanide	--	--	--	--
1,1-Dichloroethene	8.34E+00	1.31E+06	7.23E-01	4.68E+05
Methylene Chloride	4.81E-01	7.08E+04	6.85E-02	2.42E+04
Nitroso-di-N-propylamine	8.32E-04	1.60E+02	5.32E-05	5.48E+01
Aroclor 1232				
Trichloroethene	1.26E+00	1.95E+05	1.18E-01	6.52E+04
Tc-99	--	--	--	--
U-234	--	--	--	--
U-235	--	--	--	--
U-238	--	--	--	--
Np-237	--	--	--	--
Pu-239	--	--	--	--
Study Site C				
Antimony	--	--	--	--
Arsenic	--	--	--	--
Barium	--	--	--	--
Chloroform	--	--	--	--
Chromium III	--	--	--	--
Cyanide	--	--	--	--
1,1-Dichloroethene	--	--	--	--
Methylene Chloride	--	--	--	--
Nitroso-di-N-propylamine	--	--	--	--
Aroclor 1232	--	--	--	--

Table 7. PORTS Preliminary Analytic WAC Results for an OSDC (Continued)

	1,000 Year Time of Assessment			
	1,000,000 cy		3,000,000 cy	
Constituent	On-site POA (mg/kg or pCi/g)	DOE Boundary POA (mg/kg or pCi/g)	On-site POA (mg/kg or pCi/g)	DOE Boundary POA (mg/kg or pCi/g)
Trichloroethene	--	--	--	--
Tc-99	--	--	--	--
U-234	--	--	--	--
U-235	--	--	--	--
U-238	--	--	--	--
Np-237	--	--	--	--
Pu-239	--	--	--	--

Note: -- means no contaminant migration reached the POA

DOE = U.S. Department of Energy
OSDC = on-site disposal cell
POA = point of assessment
PORTS = Portsmouth Gaseous Diffusion Plant
WAC = waste acceptance criteria

PATHRAE MODEL INPUT/OUTPUT FILES

```
PATHRAE-HAZ(PC)  Version 2.3d  January 1997
  Date:  3-28-2011
  Time:  9: 4: 3

W. A. C. - January 2011 Portsmouth North Site, 3,000,000 cubic yards


                              TOTAL EQUIVALENT UPTAKE FACTORS FOR PATHRAE

                       UT(J,1)   UT(J,2)   UT(J,3)   UT(J,4)   UT(J,5)   UT(J,6)
                        RIVER     WELL     EROSION   BATHTUB  SPILLAGE    FOOD
  CONTAMINANT           L/YR      L/YR      L/YR      L/YR      L/YR      KG/YR

  Antimony            7.332E+02 7.332E+02 1.423E+03 1.423E+03 1.423E+03 2.153E-01
  Arsenic             7.434E+02 7.434E+02 7.434E+02 7.435E+02 7.435E+02 2.779E-01
  Barium              7.372E+02 7.372E+02 7.648E+02 7.652E+02 7.652E+02 5.213E-01
  Chloroform          7.328E+02 7.328E+02 7.328E+02 7.328E+02 7.328E+02 2.955E+00
  Chromium III        7.787E+02 7.788E+02 2.159E+03 2.159E+03 2.159E+03 6.445E-01
  Cyanide             7.328E+02 7.384E+02 7.570E+02 7.626E+02 7.626E+02 3.668E+01
  11Dichloroethy      7.328E+02 7.328E+02 7.328E+02 7.328E+02 7.328E+02 9.453E+00
  Mehylenechloride    7.328E+02 7.328E+02 7.328E+02 7.328E+02 7.328E+02 3.078E-02
  NnitroNpropyl       7.330E+02 7.330E+02 7.797E+02 7.799E+02 7.799E+02 2.488E+01
  Aroclor1232         7.390E+02 7.390E+02 7.390E+02 7.391E+02 7.391E+02 5.233E-01
  Trichloroethy       7.329E+02 7.329E+02 7.328E+02 7.329E+02 7.329E+02 6.425E+00

**********  Image of Input Files  **********

-- Input File:  ABCDEF.DAT
W. A. C. - January 2011 Portsmouth North Site, 3,000,000 cubic yards
2,1000.,100000.
11,0,5
1
0.,305.0,494.0,5.98E+06,1.,500.0,0.
1800.,1.83,0.,0.,0.,0.,.315,0.
20,2,0,1,1
4.0,15.2,2.295E+6,-1.,0.,1600.,.40,.705,0.90,1.
1.0E-7,8000.,.705,0.,1.0E+0, 0.01
240.,5.56E-4
4,6.3,.23,0.,1.1E-06,.01,0.,0.,0.,0.,0.
0,0,0,0,0,0
1,0,0,1
0.010,11.3,0.30,6.096, 0.025,10.,0.00001,1.,0.,.30

-- Input File:  BRCDCF.DAT
501,Antimony               0., 4.0E-04,      0.,      0.
502,Arsenic          1.5E+00, 3.0E-04,      0.,      0.
503,Barium                 0., 7.0E-02,      0.,      0.
504,Chloroform       6.1E-03, 1.0e-02,      0.,      0.
505,Chromium III           0., 1.0e+00,      0.,      0.
506,Cyanide                0., 2.0e-02,      0.,      0.
507,11Dichloroethy         0., 5.0e-02,      0.,      0.
508,Mehylenechloride 7.5E-03, 6.0e-02,      0.,      0.
509,NnitroNpropyl    7.0E+00,      0.,      0.,      0.
510,Aroclor1232      2.0E+00,      0.,      0.,      0.
511,Trichloroethy    5.9E-03,      0.,      0.,      0.



-- Input File:  INVNTRY.DAT
501, 1.00e+10,2.295E+06,    0.,     0.,       0., 0.,  Antimony
502, 1.00E+10,2.295E+06,    0.,     0.,       0., 0.,  Arsenic
503, 1.00E+10,2.295E+06,    0.,     0.,       0., 0.,  Barium
504, 1.00e+10,2.295E+06,    0.,     0.,       0., 0.,  Chloroform
505, 1.00E+10,2.295E+06,    0.,     0.,       0., 0.,  Chromium III
506, 1.00E+10,2.295E+06,    0.,     0.,1.00e+06, 0.,  Cyanide
507, 1.00E+10,2.295E+06,    0.,     0.,2.25e+03, 0.,  11Dichloroeth
508, 1.00e+10,2.295E+06,    0.,     0., 1.3e+04, 0.,  Mehylenechloride
509, 1.00E+10,2.295E+06,    0.,     0.,       0., 0.,  NnitroNpropyl
510, 1.00E+10,2.295E+06,    0.,     0.,     1.45, 0.,  Aroclor1232
511, 1.00E+10,2.295E+06,    0.,     0.,1.28E+03, 0.,  Trichloroethy


-- Input File:  RQSITE.DAT
501,   -19.,    1.9,    19.,  Antimony
502,   -29.,    1.9,    19.,  Arsenic
503,   -55.,    5.5,    55.,  Barium
504,  -0.62, 0.062,   0.62,  Chloroform
505,   -10.,    1.0,    10.,  Chromium III
506,   -9.9,   0.99,    9.9,  Cyanide
507,  -0.0636, 0.00636, 0.0636,  11Dichloroethy
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508,  -4.34e-02,4.34e-03,4.34e-02,  Mehylenechloride
509,   -0.3,  0.03,    0.3,  NnitroNpropyl
510,  -16.8,  1.68,  16.8,  Aroclor1232
511, -0.121, 0.0121,0.121,  Trichloroethy

-- Input File:  UPTAKE.DAT
0.076,   0.3,    1.60
0.67,  0.65,   2.1E-3,   438.,    438.
0.0,   2160.,  24.,      1440.,     1.,  0.83
50.,   6.,     48.,       480.,    48.
.05,  0.0008,  60.,         8.,    50.
14.,    176., 110.,         0.,    95.,    730., 6.9
Antimony          .25, 5.0e-2, 5.0e-3, 2.5e-5,   0., 4.0e-5, 1.0e+2
Arsenic           .25, 4.0e-2, 4.0E-3, 6.0E-5,   0., 2.0e-3, 0.0e+0
Barium            .25, 1.0e-1, 1.0E-2, 4.8E-4,   0., 2.0e-4, 4.0e+0
Chloroform        .25, 7.0e-1, 7.0e-2, 2.3e-6,   0., 2.3e-6, 2.3e-6
Chromium III      .25, 4.0e-2, 4.0E-3, 1.0e-5,   0., 9.0e-3, 2.0e+2
Cyanide           .25, 8.7e+0, 8.7e-1, 9.9e-8,   0., 3.1e-7, 3.5e+0
11Dichloroethy    .25, 2.24E+0, 2.24E-01, 1.07E-06, 0., 2.37E-06, 0.0e+0
Mehylenechloride .25, 7.3e-3, 7.3e-4, 1.4e-7,   0., 4.5e-7, 0.0e+0
NnitroNpropyl     .25, 5.9e+0, 5.9e-1, 2.0e-7,   0., 6.3e-7, 6.8e+0
Aroclor1232       .25, 9.1e-2, 9.1e-3, 2.7e-4,   0., 8.5e-4, 0.0e+0
Trichloroethy     .25, 1.52E+0, 1.52E-01, 2.08E-06, 0., 6.58E-06, 0.0e+0

1


**********  PATHRAE INPUT SUMMARY  **********

THERE ARE 99 CONTAMINANTS IN THE RISK FACTOR LIBRARY
NUMBER OF TIMES FOR CALCULATION IS  2
YEARS TO BE CALCULATED ARE ...

  1000.00100000.00

THERE ARE  11 CONTAMINANTS  IN THE INVENTORY FILE
THE VALUE OF IFLAG IS 0
NUMBER OF PATHWAYS IS  5

          PATHWAY            TYPE OF USAGE
                           FOR UPTAKE FACTORS
   1  GROUNDWATER TO RIVER         0
   0  3X,I2,2X,A22,6X,I2))         0
   0  3X,I2,2X,A22,6X,I2))         0
   0  3X,I2,2X,A22,6X,I2))         0
   0  3X,I2,2X,A22,6X,I2))         0

TIME OF OPERATION OF WASTE FACILITY IN YEARS                    0.
LENGTH OF REPOSITORY (M)                                      305.
WIDTH OF REPOSITORY (M)                                       494.
RIVER FLOW RATE (M**3/YR)                                       5.98E+06
STREAM FLOW RATE (M**3/YR)                                      1.00E+00
DISTANCE TO RIVER (M)                                         500.

OPERATIONAL SPILLAGE FRACTION                                   0.00E+00
DENSITY OF AQUIFER (KG/M**3)                                 1800.
LONGITUDINAL DISPERSIVITY (M)                                   1.83E+00
LATERAL DISPERSION COEFFICIENT -- Y AXIS (M**2/YR)              0.00E+00
NUMBER OF MESH POINTS FOR DISPERSION CALCULATION               20
FLAG FOR ATMOSPHERIC PATHWAY                                    0

COVER THICKNESS OVER WASTE (M)                                  4.00
THICKNESS OF WASTE IN PITS (M)                                 15.20
TOTAL WASTE VOLUME (M**3)                                       2.295E+06
DISTANCE TO WELL -- X COORDINATE (M)                           -1.
DISTANCE TO WELL -- Y COORDINATE (M)                            0.
DENSITY OF WASTE (KG/M**3)                                   1600.

FRACTION OF FOOD CONSUMED THAT IS GROWN ON SITE                  .400
FRACTION OF YEAR CONTAMINANTS CONTACT SKIN                       .705
AREA OF SKIN IN CONTACT WITH CONTAMINANTS (M**2)                 .0100
DEPTH OF PLANT ROOT ZONE (M)                                     .900
AREAL DENSITY OF PLANTS (KG/M**2)                               1.000
AVERAGE DUST LOADING IN AIR (KG/M**3)                           1.00E-07

ANNUAL ADULT BREATHING RATE (M**3/YR)                        8000.
FRACTION OF YEAR EXPOSED TO DUST                                 .705
CANISTER LIFETIME (YEARS)                                       0.
INVENTORY SCALING FACTOR                                        1.00E+00
HEIGHT OF ROOMS IN RECLAIMER HOUSE (CM)                       240.
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AIR CHANGE RATE IN RECLAIMER HOUSE (CHANGES/SEC)	5.56E-04
ATMOSPHERIC STABILITY CLASS	4
AVERAGE WIND SPEED (M/S)	6.30
FRACTION OF TIME WIND BLOWS TOWARD RECEPTOR	.2300
RECEPTOR DISTANCE FOR ATMOSPHERIC PATHWAY (M)	.0
DUST RESUSPENSION RATE FOR OFFSITE TRANSPORT (M**3/S)	1.10E-06
DEPOSITION VELOCITY (M/S)	.0100
STACK HEIGHT (M)	.0
STACK INSIDE DIAMETER (M)	.00
STACK GAS VELOCITY (M/S)	.0
HEAT EMISSION RATE FROM BURNING (CAL/S)	0.00E+00
FLAGS FOR DEGRADATION SERIES	0 0 0 0 0 0 0
FLAG FOR INPUT SUMMARY PRINTOUT	1
FLAG FOR DIRECTION OF TRENCH FILLING	0
FLAG FOR GROUNDWATER PATHWAY OPTIONS	1
AMOUNT OF WATER PERCOLATING THROUGH WASTE ANNUALLY (M)	1.00E-02
DEGREE OF SOIL SATURATION	1.000
RESIDUAL SOIL SATURATION	.000
PERMEABILITY OF VERTICAL ZONE (M/YR)	.32
SOIL NUMBER	.000
POROSITY OF AQUIFER	.30
POROSITY OF UNSATURATED ZONE	.30
DISTANCE FROM AQUIFER TO WASTE (M)	6.1
AVERAGE VERTICAL GROUNDWATER VELOCITY (M/YR)	2.50E-02
HORIZONTAL VELOCITY OF AQUIFER (M/YR)	1.13E+01
LENGTH OF PERFORATED WELL CASING (M)	10.000
SURFACE EROSION RATE (M/YR)	1.000E-05
LEACH RATE SCALING FACTOR	1.000E+00
ANNUAL RUNOFF OF PRECIPITATION (M)	0.00E+00

	-------- INGESTION -----------		-------- INHALATION ----------		
CONTAMINANT	UNIT RISK FACTORS (KG-DAY/MG)	ALLOWABLE DAILY INTAKES (MG/KG-DAY)	UNIT RISK FACTORS (KG-DAY/MG)	ALLOWABLE DAILY INTAKES (MG/KG-DAY)	HALF LIFE (YR)
Antimony	0.000E+00	4.000E-04	0.000E+00	0.000E+00	1.000E+10
Arsenic	1.500E+00	3.000E-04	0.000E+00	0.000E+00	1.000E+10
Barium	0.000E+00	7.000E-02	0.000E+00	0.000E+00	1.000E+10
Chloroform	6.100E-03	1.000E-02	0.000E+00	0.000E+00	1.000E+10
Chromium III	0.000E+00	1.000E+00	0.000E+00	0.000E+00	1.000E+10
Cyanide	0.000E+00	2.000E-02	0.000E+00	0.000E+00	1.000E+10
11Dichloroethy	0.000E+00	5.000E-02	0.000E+00	0.000E+00	1.000E+10
Mehylenechloride	7.500E-03	6.000E-02	0.000E+00	0.000E+00	1.000E+10
NnitroNpropyl	7.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+10
Aroclor1232	2.000E+00	0.000E+00	0.000E+00	0.000E+00	1.000E+10
Trichloroethy	5.900E-03	0.000E+00	0.000E+00	0.000E+00	1.000E+10

CONTAMINANT	VOLATILITY FRACTION	VAPORIZATION RATE (1/S)	SKIN ABSORPTION (M/HR)
Antimony	0.000E+00	0.000E+00	0.000E+00
Arsenic	0.000E+00	0.000E+00	0.000E+00
Barium	0.000E+00	0.000E+00	0.000E+00
Chloroform	0.000E+00	0.000E+00	0.000E+00
Chromium III	0.000E+00	0.000E+00	0.000E+00
Cyanide	0.000E+00	0.000E+00	0.000E+00
11Dichloroethy	0.000E+00	0.000E+00	0.000E+00
Mehylenechloride	0.000E+00	0.000E+00	0.000E+00
NnitroNpropyl	0.000E+00	0.000E+00	0.000E+00
Aroclor1232	0.000E+00	0.000E+00	0.000E+00
Trichloroethy	0.000E+00	0.000E+00	0.000E+00

CONTAMINANT	INPUT LEACH (1/YR)	FINAL LEACH (1/YR)	SOLUBILITY (MG/L)	INPUT INVENTORY (KG)
Antimony	-1.900E+01	2.143E-05	0.000E+00	2.295E+06
Arsenic	-2.900E+01	1.409E-05	0.000E+00	2.295E+06
Barium	-5.500E+01	7.451E-06	0.000E+00	2.295E+06
Chloroform	-6.200E-01	5.092E-04	0.000E+00	2.295E+06
Chromium III	-1.000E+01	4.036E-05	0.000E+00	2.295E+06
Cyanide	-9.900E+00	4.076E-05	1.000E+06	2.295E+06

11Dichloroethy	-6.360E-02	1.477E-03	2.250E+03	2.295E+06
Mehylenechloride	-4.340E-02	1.781E-03	1.300E+04	2.295E+06
NnitroNpropyl	-3.000E-01	8.435E-04	0.000E+00	2.295E+06
Aroclor1232	-1.680E+01	9.519E-07	1.450E+00	2.295E+06
Trichloroethy	-1.210E-01	8.403E-04	1.280E+03	2.295E+06

CONTAMINANT	AQUIFER SORPTION	AQUIFER RETARDATION	VERTICAL SORPTION	VERTICAL RETARDATION
Antimony	1.900E+00	1.240E+01	1.900E+01	1.150E+02
Arsenic	1.900E+00	1.240E+01	1.900E+01	1.150E+02
Barium	5.500E+00	3.400E+01	5.500E+01	3.310E+02
Chloroform	6.200E-02	1.372E+00	6.200E-01	4.720E+00
Chromium III	1.000E+00	7.000E+00	1.000E+01	6.100E+01
Cyanide	9.900E-01	6.940E+00	9.900E+00	6.040E+01
11Dichloroethy	6.360E-03	1.038E+00	6.360E-02	1.382E+00
Mehylenechloride	4.340E-03	1.026E+00	4.340E-02	1.260E+00
NnitroNpropyl	3.000E-02	1.180E+00	3.000E-01	2.800E+00
Aroclor1232	1.680E+00	1.108E+01	1.680E+01	1.018E+02
Trichloroethy	1.210E-02	1.073E+00	1.210E-01	1.726E+00

	BIOACCUMULATION FACTORS			
CONTAMINANT	SOIL-PLANT Bv	SOIL-PLANT Br	FORAGE-MILK Fm (D/L)	FORAGE-MEAT Ff (D/KG)
Antimony	5.000E-02	5.000E-03	2.500E-05	4.000E-05
Arsenic	4.000E-02	4.000E-03	6.000E-05	2.000E-03
Barium	1.000E-01	1.000E-02	4.800E-04	2.000E-04
Chloroform	7.000E-01	7.000E-02	2.300E-06	2.300E-06
Chromium III	4.000E-02	4.000E-03	1.000E-05	9.000E-03
Cyanide	8.700E+00	8.700E-01	9.900E-08	3.100E-07
11Dichloroethy	2.240E+00	2.240E-01	1.070E-06	2.370E-06
Mehylenechloride	7.300E-03	7.300E-04	1.400E-07	4.500E-07
NnitroNpropyl	5.900E+00	5.900E-01	2.000E-07	6.300E-07
Aroclor1232	9.100E-02	9.100E-03	2.700E-04	8.500E-04
Trichloroethy	1.520E+00	1.520E-01	2.080E-06	6.580E-06

***** PEAK CONCENTRATIONS AND TIMES FOR PATHWAY 1 *****
***** RIVER AT 500.0 M *****

CONTAMINANT	PEAK CONCENTRATION (MG/L)	PEAK TIME (YR)	AVERAGE DOSE AT PEAK TIME (MG/KG-DAY)	AVERAGE RISK AT PEAK TIME (HE/LIFE)	FRACTION OF ADI
Antimony	8.22E-03	35748.3	2.36E-04		5.90E-01
Arsenic	5.41E-03	35748.3	1.57E-04	2.36E-04	5.24E-01
Barium	2.86E-03	102798.0	8.25E-05		1.18E-03
Chloroform	1.95E-01	1818.8	5.61E-03	3.42E-05	5.61E-01
Chromium III	1.55E-02	18985.9	4.72E-04		4.72E-04
Cyanide	1.56E-02	18799.6	4.49E-04		2.24E-02
11Dichloroethy	5.67E-01	575.3	1.63E-02		3.25E-01
Mehylenechloride	6.83E-01	441.8	1.96E-02	1.47E-04	3.27E-01
NnitroNpropyl	3.24E-01	1103.6	9.29E-03	6.50E-02	
Aroclor1232	3.65E-04	31650.8	1.06E-05	2.11E-05	
Trichloroethy	3.23E-01	703.6	9.25E-03	5.46E-05	

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PATHRAE-RAD(PC)  Version 2.2d  February 1995
   Date:  3- 8-2011
   Time: 10:18:38

W. A. C. - January 2011 Portsmouth North Site, 3,000,000 cubic yards

*****  Mirror Image of Input Files  *****

-- Input File:  ABCDEF.DAT
W. A. C. - January 2011 Portsmouth North Site, 3,000,000 cubic yards
2,1000.,100000.
9,0,1
1,2
0.,250.0,603.0,8.93E+5,1.,500.0,0.
1800.,1.83,0.,0.,0.,0.,.315,0.
20,2,0,1,1
4.0,15.2,2.295E+6,-1.,0.,1600.,.40,.705,0.90,1.
1.0E-7,8000.,.705,0.,1.0E+0, 0.01
240.,5.56E-4
4,6.3,.23,0.,1.1E-06,.01,0.,0.,0.,0.,0.
0,0,0,0,0,0,0
1,0,0,1
0.010,11.3,0.30,6.096, 0.025,10.,0.00001,1.,0.,.30

-- Input File:  BRCDCF.DAT
108,Tc-99     1.5E-06,  7.5E-06,  6.3E-11,
038,U-234     2.83E-04, 1.3E-01,  8.74E-08,
039,U-235     2.67E-04, 1.2E-01,  1.73E-05,
041,U-238     2.7E-04,  1.2E-01,  2.82E-06,
042,Np-237    4.4E-03,  4.9E-01,  3.2E-06,
043,Pu-238    3.2E-03,  3.9E-01,  9.79E-08,
044,Pu-239    3.5E-03,  4.3E-01,  4.29E-08,
045,Pu-240    3.5E-03,  5.1E-01,  8.2E-08,
048,Am-241    3.6E-03,  4.4E-01,  3.21E-06

-- Input File:  INVNTRY.DAT
108, 2.13E+05, 2.295E+06,  29.2,  .089,      0., 0.,   1.,  Tc-99
038, 2.44E+05, 2.295E+06,  35.5,  .070,      0., 0.,   1.,  U-234
039, 7.04E+08, 2.295E+06,  21.6,  .169,      0., 0.,   1.,  U-235
041, 4.47E+09, 2.295E+06,  12.0,  .718,      0., 0.,   1.,  U-238
042, 2.14E+06, 2.295E+06,  34.9,  .072,      0., 0.,   1.,  Np-237
043, 8.78E+01, 2.295E+06,  45.3,  .055,      0., 0.,   1.,  Pu-238
044, 2.41E+04, 2.295E+06,  25.8,  .113,      0., 0.,   1.,  Pu-239
045, 6.54E+03, 2.295E+06,  46.3,  .054,      0., 0.,   1.,  Pu-240
048, 4.32E+02, 2.295E+06,  43.5,  .057,      0., 0.,   1.,  Am-241


-- Input File:  RQSITE.DAT
108,-3.00e+0, 0.00E+0, 3.00E+0,  Tc-99
038,-4.00e+1, 7.00E+0, 2.00E+1,  U-234
039,-4.00e+1, 7.00E+0, 2.00E+1,  U-235
041,-4.00e+1, 7.00E+0, 2.00E+1,  U-238
042,-5.56e+1, 4.00E+1, 4.00E+1,  Np-237
043,-5.76e+1, 4.00E+1, 4.00E+1,  Pu-238
044,-5.76e+1, 4.00E+1, 4.00E+1,  Pu-239
045,-5.76e+1, 4.00E+1, 4.00E+1,  Pu-240
048,-5.76e+1, 4.00E+1, 4.00E+1,  Am-241

-- Input File:  UPTAKE.DAT
0.076,   0.3,    1.60
0.67,  0.65,   2.1E-3,   438.,    438.
0.0,   2160.,  24.,      1440.,     1.,  0.83
50.,   6.,     48.,      480.,     48.
.05,  0.0008,  60.,        8.,     50.
14.,     176., 110.,       0.,     95.,    730., 6.9
Tc-99              .25, 2.5E-1, 2.5E-2, 1.0E-3,   0., 1.0E-4, 1.5E+1
U-234              .25, 2.5E-3, 2.5E-4, 5.0E-4,   0., 3.4E-4, 2.0E+0
U-235              .25, 2.5E-3, 2.5E-4, 5.0E-4,   0., 3.4E-4, 2.0E+0
U-238              .25, 2.5E-3, 2.5E-4, 5.0E-4,   0., 3.4E-4, 2.0E+0
Np-237             .25, 2.5E-3, 2.5E-4, 5.0E-6,   0., 2.0E-4, 1.0E+1
Pu-238             .25, 2.5E-4, 2.5E-5, 2.0E-6,   0., 1.4E-5, 3.5E+0
Pu-239             .25, 2.5E-4, 2.5E-5, 2.0E-6,   0., 1.4E-5, 3.5E+0
Pu-240             .25, 2.5E-4, 2.5E-5, 2.0E-6,   0., 1.4E-5, 3.5E+0
Am-241             .25, 2.5E-4, 2.5E-5, 5.0E-6,   0., 2.0E-4, 2.5E+1
1


                      TOTAL EQUIVALENT UPTAKE FACTORS FOR PATHRAE
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NUCLIDE	UT(J,1) RIVER L/YR	UT(J,2) WELL L/YR	UT(J,3) EROSION L/YR	UT(J,4) BATHTUB L/YR	UT(J,5) SPILLAGE L/YR	UT(J,6) FOOD KG/YR
Tc-99	7.404E+02	7.404E+02	8.438E+02	8.439E+02	8.439E+02	1.469E+00
U-234	7.380E+02	7.380E+02	7.518E+02	7.518E+02	7.518E+02	1.357E-02
U-235	7.380E+02	7.380E+02	7.518E+02	7.518E+02	7.518E+02	1.357E-02
U-238	7.380E+02	7.380E+02	7.518E+02	7.518E+02	7.518E+02	1.357E-02
Np-237	7.338E+02	7.338E+02	8.028E+02	8.028E+02	8.028E+02	1.122E-02
Pu-238	7.329E+02	7.329E+02	7.570E+02	7.570E+02	7.570E+02	1.058E-03
Pu-239	7.329E+02	7.329E+02	7.570E+02	7.570E+02	7.570E+02	1.059E-03
Pu-240	7.329E+02	7.329E+02	7.570E+02	7.570E+02	7.570E+02	1.059E-03
Am-241	7.338E+02	7.338E+02	9.063E+02	9.063E+02	9.063E+02	1.121E-03

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********** PATHRAE INPUT SUMMARY **********

THERE ARE 80 ISOTOPES IN THE DOSE FACTOR LIBRARY
NUMBER OF TIMES FOR CALCULATION IS  2
YEARS TO BE CALCULATED ARE ...

  1000.00100000.00

THERE ARE   9 ISOTOPES IN THE INVENTORY FILE
THE VALUE OF IFLAG IS 0
NUMBER OF PATHWAYS IS  1

           PATHWAY            TYPE OF USAGE
                             FOR UPTAKE FACTORS
   1  GROUNDWATER TO RIVER          2

TIME OF OPERATION OF WASTE FACILITY IN YEARS                   0.
LENGTH OF REPOSITORY (M)                                     250.
WIDTH OF REPOSITORY (M)                                      603.
RIVER FLOW RATE (M**3/YR)                                      8.93E+05
STREAM FLOW RATE (M**3/YR)                                     1.00E+00
DISTANCE TO RIVER (M)                                        500.

OPERATIONAL SPILLAGE FRACTION                                  0.00E+00
DENSITY OF AQUIFER (KG/M**3)                                1800.
LONGITUDINAL DISPERSIVITY (M)                                  1.83E+00
LATERAL DISPERSION COEFFICIENT -- Y AXIS (M**2/YR)             0.00E+00
NUMBER OF MESH POINTS FOR DISPERSION CALCULATION              20
FLAG FOR GAMMA PATHWAY OPTIONS                                 2
FLAG FOR GAMMA BUILDUP CALCULATION                             0
FLAG FOR ATMOSPHERIC PATHWAY                                   0

COVER THICKNESS OVER WASTE (M)                                 4.00
THICKNESS OF WASTE IN PITS (M)                                15.20
TOTAL WASTE VOLUME (M**3)                                      2.295E+06
DISTANCE TO WELL -- X COORDINATE (M)                          -1.
DISTANCE TO WELL -- Y COORDINATE (M)                           0.
DENSITY OF WASTE (KG/M**3)                                  1600.

FRACTION OF FOOD CONSUMED THAT IS GROWN ON SITE                 .400
FRACTION OF YEAR SPENT IN DIRECT RADIATION FIELD                .705
DEPTH OF PLANT ROOT ZONE (M)                                    .900
AREAL DENSITY OF PLANTS (KG/M**2)                              1.000
AVERAGE DUST LOADING IN AIR (KG/M**3)                          1.00E-07
ANNUAL ADULT BREATHING RATE (M**3/YR)                       8000.

FRACTION OF YEAR EXPOSED TO DUST                                .705
CANISTER LIFETIME (YEARS)                                     0.
INVENTORY SCALING FACTOR                                       1.00E+00
HEIGHT OF ROOMS IN RECLAIMER HOUSE (CM)                      240.
AIR CHANGE RATE IN RECLAIMER HOUSE (CHANGES/SEC)               5.56E-04
RADON EMANATING POWER OF THE WASTE                             0.00E+00

DIFFUSION COEFF. OF RADON IN WASTE (CM**2/SEC)                 0.00E+00
DIFFUSION COEFF. OF RN IN CONCRETE (CM**2/SEC)                 0.00E+00
THICKNESS OF CONCRETE SLAB FLOOR (CM)                           .0
DIFFUSION COEFF. OF RADON IN COVER (CM**2/SEC)                 0.00E+00
ATMOSPHERIC STABILITY CLASS                                    4
AVERAGE WIND SPEED (M/S)                                       6.30

FRACTION OF TIME WIND BLOWS TOWARD RECEPTOR                     .2300
RECEPTOR DISTANCE FOR ATMOSPHERIC PATHWAY (M)                   .0
DUST RESUSPENSION RATE FOR OFFSITE TRANSPORT (M**3/S)          1.10E-06
DEPOSITION VELOCITY (M/S)                                       .0100
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STACK HEIGHT (M)		.0
STACK INSIDE DIAMETER (M)		.00
STACK GAS VELOCITY (M/S)		.0
HEAT EMISSION RATE FROM BURNING (CAL/S)		0.00E+00
DECAY CHAIN FLAGS	0 0 0 0 0 0	0
FLAG FOR INPUT SUMMARY PRINTOUT		1
FLAG FOR DIRECTION OF TRENCH FILLING		0
FLAG FOR GROUNDWATER PATHWAY OPTIONS		1
AMOUNT OF WATER PERCOLATING THROUGH WASTE ANNUALLY (M)		1.00E-02
DEGREE OF SOIL SATURATION		1.000
RESIDUAL SOIL SATURATION		.000
PERMEABILITY OF VERTICAL ZONE (M/YR)		.32
SOIL NUMBER		.000
POROSITY OF AQUIFER		.30
POROSITY OF UNSATURATED ZONE		.30
DISTANCE FROM AQUIFER TO WASTE (M)		6.1
AVERAGE VERTICAL GROUNDWATER VELOCITY (M/YR)		2.50E-02
HORIZONTAL VELOCITY OF AQUIFER (M/YR)		11.3
LENGTH OF PERFORATED WELL CASING (M)		10.000
SURFACE EROSION RATE (M/YR)		1.000E-05
LEACH RATE SCALING FACTOR		1.000E+00
ANNUAL RUNOFF OF PRECIPITATION (M)		0.00E+00

NUCLIDE	INGESTION DOSE FACTORS (MREM/PCI)	INHALATION DOSE FACTORS (MREM/PCI)	DIRECT GAMMA DOSE FACTORS (MREM-M2/PCI-YR)	HALF LIFE (YR)
Tc-99	1.500E-06	7.500E-06	6.300E-11	2.130E+05
U-234	2.830E-04	1.300E-01	8.740E-08	2.440E+05
U-235	2.670E-04	1.200E-01	1.730E-05	7.040E+08
U-238	2.700E-04	1.200E-01	2.820E-06	4.470E+09
Np-237	4.400E-03	4.900E-01	3.200E-06	2.140E+06
Pu-238	3.200E-03	3.900E-01	9.790E-08	8.780E+01
Pu-239	3.500E-03	4.300E-01	4.290E-08	2.410E+04
Pu-240	3.500E-03	5.100E-01	8.200E-08	6.540E+03
Am-241	3.600E-03	4.400E-01	3.210E-06	4.320E+02

NUCLIDE	VOLATILITY FRACTION	GAMMA ENERGY (MEV)	GAMMA ATTENUATION (1/M)
Tc-99	0.000E+00	8.900E-02	2.920E+01
U-234	0.000E+00	7.000E-02	3.550E+01
U-235	0.000E+00	1.690E-01	2.160E+01
U-238	0.000E+00	7.180E-01	1.200E+01
Np-237	0.000E+00	7.200E-02	3.490E+01
Pu-238	0.000E+00	5.500E-02	4.530E+01
Pu-239	0.000E+00	1.130E-01	2.580E+01
Pu-240	0.000E+00	5.400E-02	4.630E+01
Am-241	0.000E+00	5.700E-02	4.350E+01

NUCLIDE	INPUT LEACH RATE (1/YR)	FINAL LEACH RATE (1/YR)	SOLUBILITY (MOLE/L)	INPUT INVENTORY (CI)
Tc-99	-3.000E+00	1.290E-04	0.000E+00	2.295E+06
U-234	-4.000E+01	1.023E-05	0.000E+00	2.295E+06
U-235	-4.000E+01	1.023E-05	0.000E+00	2.295E+06
U-238	-4.000E+01	1.023E-05	0.000E+00	2.295E+06
Np-237	-5.560E+01	7.371E-06	0.000E+00	2.295E+06
Pu-238	-5.760E+01	7.115E-06	0.000E+00	2.295E+06
Pu-239	-5.760E+01	7.115E-06	0.000E+00	2.295E+06
Pu-240	-5.760E+01	7.115E-06	0.000E+00	2.295E+06
Am-241	-5.760E+01	7.115E-06	0.000E+00	2.295E+06

NUCLIDE	AQUIFER SORPTION	AQUIFER RETARDATION	VERTICAL SORPTION	VERTICAL RETARDATION
Tc-99	0.000E+00	1.000E+00	3.000E+00	1.900E+01
U-234	7.000E+00	4.300E+01	2.000E+01	1.210E+02
U-235	7.000E+00	4.300E+01	2.000E+01	1.210E+02
U-238	7.000E+00	4.300E+01	2.000E+01	1.210E+02
Np-237	4.000E+01	2.410E+02	4.000E+01	2.410E+02
Pu-238	4.000E+01	2.410E+02	4.000E+01	2.410E+02

Pu-239	4.000E+01	2.410E+02	4.000E+01	2.410E+02
Pu-240	4.000E+01	2.410E+02	4.000E+01	2.410E+02
Am-241	4.000E+01	2.410E+02	4.000E+01	2.410E+02

BIOACCUMULATION FACTORS

NUCLIDE	SOIL-PLANT Bv	SOIL-PLANT Br	FORAGE-MILK Fm (D/L)	FORAGE-MEAT Ff (D/KG)
Tc-99	2.500E-01	2.500E-02	1.000E-03	1.000E-04
U-234	2.500E-03	2.500E-04	5.000E-04	3.400E-04
U-235	2.500E-03	2.500E-04	5.000E-04	3.400E-04
U-238	2.500E-03	2.500E-04	5.000E-04	3.400E-04
Np-237	2.500E-03	2.500E-04	5.000E-06	2.000E-04
Pu-238	2.500E-04	2.500E-05	2.000E-06	1.400E-05
Pu-239	2.500E-04	2.500E-05	2.000E-06	1.400E-05
Pu-240	2.500E-04	2.500E-05	2.000E-06	1.400E-05
Am-241	2.500E-04	2.500E-05	5.000E-06	2.000E-04

***** PEAK CONCENTRATIONS AND TIMES FOR PATHWAY 1 *****
***** RIVER AT 500.0 M *****

NUCLIDE	PEAK CONCENTRATION (CI/M**3)	PEAK TIME (YR)	AVERAGE DOSE AT PEAK TIME (MREM/YR)	AVERAGE RISK AT PEAK TIME (HE/YR)
Tc-99	3.26E-04	4723.4	3.63E+02	1.02E-04
U-234	2.39E-05	32965.8	5.00E+03	1.40E-03
U-235	2.63E-05	39288.8	5.18E+03	1.45E-03
U-238	2.63E-05	39288.8	5.24E+03	1.47E-03
Np-237	1.85E-05	78257.8	5.96E+04	1.67E-02
Pu-239	2.03E-06	75869.9	5.20E+03	1.45E-03
Pu-240	6.10E-09	74646.3	1.56E+01	4.38E-06

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Response to Ohio EPA Comments Received August 1, 2011 on D1 Remedial Investigation and Feasibility Study (RI/FS) Work Plan for the Sitewide Waste Disposition Evaluation Project at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

General Comments

1) The D&D activities are being conducted in accordance with the DFF&O, which was entered into pursuant to Ohio's laws and regulations. The DFF&O utilizes the CERCLA process as a framework for activities conducted pursuant to the DFF&O. In several places, the RI/FS Work Plan refers to "CERCLA" inappropriately. Wherever there is a reference to work being done pursuant to the DFF&O or D&D waste, the reference should be described as D&D work/documents/waste, etc., and not CERCLA work/documents/waste, etc. Ohio EPA has discussed this issue with the US DOE several times and has provided comments to this issue in previous documents. Revise the RI/FS Work Plan to include accurate terminology.

   Per the DFF&O, revise the Waste Disposition RI/FS Work Plan and use the terms "Facility" and "Site" consistent with how the terms are defined in the DFF&O. Use of the word "Facility" may imply that certain D&D activities are subject to and part of the hazardous waste facility at Portsmouth. Furthermore, "CERCLA D&D", "CERCLA waste", "CERCLA decision", "CERCLA waste disposal alternatives", etc., references need to be changed to just D&D throughout. Further, caution should be advised when using the term "RCRA" since on the federal level, "RCRA" refers to both solid waste and hazardous waste. Substitution of the term "hazardous waste" would be more consistent with both state and federal law.

   DOE Response: All references to facility, CERCLA, and RCRA have been evaluated throughout the document with revisions made to building/structure, DFF&O, D&D, or hazardous waste, as appropriate.

2) The document references data from various time periods of the investigation of the PORTS facility as well as other US DOE facilities. The data should either be attached to the document for quick reference or placed in the electronic reading room with a reference placed in the document for easier review of the information contained within the document. Without such references it is difficult to complete the review of this document and determine if the data referenced is relevant to this process.

   DOE Response: Data summaries only are included in the Work Plan, the basis of which is the GIS-data warehouse for PORTS. Electronic copies of Excel tables from the database with historical data from each study area have been placed in the electronic reading room for reference.

3) The document refers to "guidance documents" used or that will be used to complete this process. Ensure that the appropriate guidance documents as referenced in Attachment C of the DFF&Os are incorporated into this process.

   DOE Response: Guidance documents as referenced in Attachment C of the DFF&Os will be incorporated into the waste disposition evaluation process as applicable, with appropriate reference made. The second paragraph of Section 3.1.3 now reads "Sampling and analytical methods will be based on applicable EPA, Ohio EPA, and DOE guidance, as well as guidance documents listed in Attachment C of the DFF&O and will be described in the SAPs."

4) US DOE recently made a determination to investigate a previously unevaluated potential on-site disposal cell location. This alternative location was not evaluated as part of this RI/FS Work Plan. Revise the document to include all the geotechnical and geochemical data necessary to evaluate this addition location. US DOE is required to include this information in a revised Waste Disposition RI/FS Work Plan, etc., as required by the DFF&O.

DOE Response: Information related to Study Area D has been incorporated throughout the Waste Disposition RI/FS Work Plan.

5) In the BOP EE/CA SOW and the Process Building RI/FS Work Plan, US DOE has included the alternatives of tearing down the process buildings or leaving the process buildings standing. The decision of tearing down process buildings or leaving the process buildings standing should not be included in the Waste Disposition RI/FS Work Plan. The Waste Disposition RI/FS Work Plan includes a no action alternative of leaving waste piles. Of the alternatives presented in the Waste Disposition RI/FS Work Plan, only two, on-site disposal (if an OSDC is available) or disposal at an off-site cell is viable for further consideration. Demolishing the process buildings and leaving piles of building waste is precluded by both ARARs (solid waste rules) as well as, the DFF&O which requires a completion date for staging of any D&D waste so as to avoid waste piles sitting at the site for a prolonged period of time. The completion date for removal of staged D&D waste is a Milestone. Revise the Waste Disposition RI/FS Work Plan so that it does not refer to leaving waste piles in place.

DOE Response: In accordance with the DFF&O and RI/FS guidance, a no action alternative is included in the analysis to compare the action alternatives to in terms of risk reduction, etc. Therefore, while it is agreed that the no action alternative would not meet threshold criteria, it is included in the work plan to be further described in the FS. Text has been revised to state that the no action alternative is the same as the building no action; that is, leaving the buildings to degrade.

6) The report lacks many details of the modeling effort that was used to justify the selection of Site C for the On Site Disposal Cell (OSDC). In future reports concerning modeling, Ohio EPA would recommend that US DOE follow Chapter 14 of the Ohio EPA-DDAGW Technical Guidance Manual which provides the information that the agency requires when reviewing ground water modeling results. The following link is for this reference:
http://www.epa.ohio.gov/portals/28/documents/TGM-14_final1107W.pdf

DOE Response: A separate document titled *Work Plan for Modeling Analysis in Support of Regulatory Decisions at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* has been written. Requirements of document TGM-14 have been incorporated into that document, as appropriate.

Specific Comments

7) The DFF&O only addresses on-site D&D waste, not waste that is off-site. See, generally, Section V. General Provisions, Section III. Definitions, etc. Specifically, "Site" is defined as "all buildings, structures, and contents thereof subject to D&D as defined in this Section, including areas where D&D materials are stored, treated, managed or disposed in accordance with these

Orders at the Facility[1]." The DFFOs at paragraph 9 specifically cite to the NCP definition of "on-site" which states that "on-site" means the areal extent of contamination and all suitable areas <u>in very close proximity</u> to the contamination necessary for implementation of the response action." (Emphasis added). In the Executive Summary, and elsewhere (see comments below, relating to the description of alternatives and ARARs appendix), statements are made regarding off-site waste, for example the following: "including any potential waste found outside the US DOE-owned PORTS reservation related to past PORTS operations." Ohio EPA throughout negotiations indicated that off-site waste should not be brought to the Site for disposal in any OSDC. If it is US DOE's intention to bring waste back to Portsmouth because of some past relation to the Site, this should have been disclosed during negotiations, and will require US DOE to demonstrate to Ohio EPA's satisfaction: 1) the relationship of the waste to the Site justifies it being treated as part of the Site, as defined in the D&D DFF&O; and 2) treating it as part of the Site is in accordance with Section 104 of CERCLA.

DOE Response: Reference to potential waste found outside the DOE-owned PORTS reservation related to past PORTS operations has been removed from the Work Plan. However, DOE reserves the right to enter into negotiations with Ohio EPA regarding offsite waste deemed associated with past-PORTS operations that may be a candidate waste stream for the OSDC, if constructed.

8) Section 1.2: This section mentions that "relevant data from other US DOE sites will also be used to evaluate the waste disposition alternatives." Identify the data and how it influenced US DOE's remedy alternative analysis.

DOE Response: The intent was to incorporate relevant information from feasibility studies performed for other waste disposition evaluations within the DOE complex, particularly those for the Fernald site near Cincinnati, Ohio and the Oak Ridge Reservation in Oak Ridge, Tennessee. Additional text has been added for clarity.

9) Section 1.2.1: This section describes the waste volumes that are expected to be generated for disposal in a potential cell. It includes "RCRA" investigation and remediation wastes, but fails to note that it would be illegal under Ohio law to dispose of such waste in an unpermitted cell without an exemption from the Director. The Waste Disposition RI/FS Work Plan should be structured to include analysis of the potential cell both with and without including these waste streams, insofar as the availability of an exemption cannot be determined at this time. An exemption may be considered when US DOE has the ability to identify the particular waste streams for which they desire an exemption, quantify the contaminants and identify any treatment necessary, and when US DOE can identify with certainty the parameters which the cell will meet.

Also, wherever "soils" are mentioned in this section and in other portions of the Waste Disposition RI/FS Work Plan, US DOE needs to distinguish between soils/environmental media generated by corrective action investigation and remediation, and residual soils that may be removed during D&D throughout the Waste Disposition RI/FS Work Plan (see Definition of D&D in the DFF&O).

DOE Response: Text has been added to clearly indicate that waste, if generated from corrective actions performed under the RCRA Consent Decree/Administrative Order on Consent, would only be disposed of in the potential OSDC if authorization and/or an exemption

[1] "Facility" means the U.S. Department of Energy Portsmouth Gaseous Diffusion Plant located at Piketon, Pike County, Ohio. The U.S. Department of Energy Portsmouth Gaseous Diffusion Plant is described more fully in Exhibit 1, Attached.

for such placement is obtained from the Director. In addition, the Work Plan text has been reviewed and clarification between soils generated during corrective actions and residual soil has been made, where needed.

10) Section 1.2.1, Table 1, page 8: This table should note that hazardous wastes generated through the corrective action (soils) will only be included in cell volumes if an exemption is properly obtained. Further, Footnote "a" to this table is internally inconsistent. It states "This refers to soil being generated during the RCRA corrective action process and does not imply soil will be a RCRA-listed or characteristically hazardous waste. Most of this soil is expected to be LLW or MLLW." MLLW (or "Mixed Low Level Waste") is, of course, hazardous waste, and the management and disposal of such is regulated through Ohio hazardous waste law and federal RCRA.

DOE Response: Concur. A General Note referring to appropriate authorization and/or an exemption for disposal of RCRA Consent Decree/Administrative Order on Consent waste has been added to Table 1 and the phrase "… Most of this soil is expected to be LLW or MLLW…" has been removed.

11) Table 2, Footnote 8, page 8: US DOE must redraft to quote the definition of D&D, as opposed to summarizing.

DOE Response: General Note 8 has been revised to quote the definition of "residual soil" included in the definition of D&D in the DFF&O.

12) Figures 10 and 11, pages 22 and 23: The figures reference locations for samples collected at various depths in the northern portion of the site. The samples were not collected for the purposes of potentially siting a waste disposal cell but for evaluating contaminants present from US DOE activities. How much data can be used for geotechnical and geochemical purposes? Is the data collected useful for citing purposes or will additional data collection be necessary? Discuss how the data may be used for various purposes in development of the alternatives array.

DOE Response: The data may be used to assess the level of contamination present at these locations, indicating that initial remedial actions may be required if selected as a site for the OSDC. Text has been revised to indicate that additional samples are to be collected from the study areas for geotechnical and geochemical analyses, which will support the siting evaluation for a potential OSDC.

13) Section 1.2.5, Table 7, page 25: The maximum detected concentration of Benzo(a)pyrene at 8.56E+01 mg/kg exceeds the Industrial PRG for 1.0E-05 risk of 7.84 mg/kg, but Table 7 does not indicate this exceedance. Is there an error in the maximum reported in the Table? Was this exceedance overlooked? Revise Table 7 accordingly.

DOE Response: The maximum reported value is correct. Table 7 has been revised to indicate an exceedance of the PRG.

14) Section 3.0, page 37: The third paragraph states, "The preferred alternative will be protective of human health and the environment and comply with applicable ARARs, or needed ARAR waivers will be identified." Pursuant to the requirements of Attachment A of the DFF&O, "With the exception of the "no action" alternative, all alternatives under consideration must, at a minimum, ensure protection of human health and the environment and comply with the applicable or relevant and appropriate requirements of state and federal laws and regulations or satisfy the requirements of

42 U.S.C. Section 9621 and 40 CFR Section 300.430 pertaining to waiver or non-attainment of ARARs." Consistent with Section VI (Performance of the Work by Respondent) of the Orders, if an OSDC is evaluated as a possible remedial alternative under the Site-Wide Waste Disposition Evaluation project, Respondent shall evaluate at least one alternative or sub-alternative that is fully ARARs compliant, with no ARARs waived.

DOE Response: Text has been revised to include information from the DFF&O, as requested. At least one alternative or subalternative developed in the FS will be fully ARAR compliant.

15) The RI/FS SOW, Section 3.1 requires that RI/FS tasks be developed in conjunction with supporting documentation including SAPs, HASPs, and QAPPs. These documents are not optional. Section 3.1.1.7 of the Waste Disposition Work Plan indicates that "Appropriate plans, such as SAPs, HASPs, and QAPPs, will be developed as needed to support data collection activities identified in the [Waste Disposition] RI/FS Work Plan." Revise to delete the phrase "as needed."

DOE Response: The phrase "… as needed …" has been deleted as requested.

16) Section 3.1.1.5, page 39: The documents notes "CERCLA, Section 121, mandates the identification of ARARs during the development of remedial alternatives." US DOE must keep in mind that the DFF&O also requires the development of ARARs. Furthermore, this section of the document notes, "The expanded list was included to initiate discussion with the regulatory agencies early in the RI/FS." As a result of the additional ARARs presented in this correspondence, Ohio EPA believes that a meeting to begin immediate discussion of the ARARs is necessary to identify the appropriate ARARs.

DOE Response: The reference to CERCLA has been replaced with a reference to the DFF&O. Further, DOE concurs that continued dialogue is necessary with Ohio EPA to discuss and finalize the ARARs for the Waste Disposition RI/FS. As agreed to in the September 6, 2011 meeting, the ARARs in the work plan will be considered draft.

17) Section 3.1.1.6, page 39: The document states, "Much of the information needed to support the FS is already available in existing reference sources." This data must be available to Ohio EPA for evaluation of the project and to determine if additional data gaps still exist. Ensure that the data is readily available either through the e-room or properly referenced to allow for easy retrieval and review.

DOE Response: Documents that serve as sources of information summarized in this Work Plan have been placed in the e-room as reference for Ohio EPA. Referenced documents will also be placed in the project Administrative Record.

18) Section 3.1.5.1, Paragraph 1, page 41: The text states, "The baseline risk assessment will be an evaluation of the no action alternative, which is defined as no disposal. Not disposing of the waste allows for the unmitigated release of constituents from building debris piles after demolition of the contaminated facilities which allows for the transport of contaminants to where exposures may occur." As indicated in comment 5, leaving waste piles is not an allowable no action alternative. The potential risks of each alternative should be assessed for a complete, thorough evaluation of the alternatives under consideration for the Site-Wide Waste Disposition Project in accordance with the requirements of Attachment A of the DFF&O. Specifically, Section 5.1 of Attachment A, which states, "The streamlined risk evaluation shall discuss potential on-Site receptors (workers) and off-Site receptors (plant neighbors and other members of the public that might directly contact waste streams from the Site during and after on-Site disposal, and during off-Site transportation of

waste), and environmental receptors." DOE has not fully assessed the potential risk associated with potential human and ecological receptors for all the alternatives presented in this document. Revise the document accordingly.

DOE Response: As noted in the response to comment 5, the no action alternative is the degradation of buildings with no disposal. Although information about the long- and short-term effectiveness through a risk assessment is requested in the DFF&O outline for Section 3.1.5.1, the alternatives have not yet been developed; therefore, this information will be presented later in the FS process, after alternatives are developed. The information in the initial threat to human health section will continue to assess the risk from taking no action. This allows a comparison of risk reduction afforded by each alternative to determine the overall cost-effectiveness of the alternative. The information requested in the comment will be developed. It is just part of the alternative evaluation.

19) Section 3.1.5.2, Paragraph 1, page 41: The text states, "Under the no action baseline conditions from potential contaminants through contaminant migration via runoff or through ecological receptors inhabiting the area of debris." Why aren't ecological risks considered for the scenario of on-site disposal? Wouldn't construction of an on-site disposal cell potentially displace some flora and fauna? As stated in comment #18 above, Section 5.1 of Attachment A to the DFF&O requires that potential risk to environmental receptors during and after on-Site disposal. Also, Section 4.0 of Attachment A requires full characterization of the environmental setting of the site, which includes ecological receptors. Revise the text as necessary to discuss potential or explain why it was omitted from the text.

DOE Response: The ecological impacts of on- and off-site transportation and disposal will be assessed as part of the evaluation of alternatives. To allow for a logical read of the document, this evaluation has been moved to the FS portion of the process, once the alternatives have been developed. A reference to the *Methods for Conducting Ecological Risk Assessments and Ecological Risk Evaluations at the Portsmouth Gaseous Diffusion Plant* has been added.

20) Section 3.1.5.4, page 44: US DOE asserts that no additional data or information is needed to conduct a baseline risk assessment in the Remedial Investigation. The documents states, "The evaluation of long-term effectiveness in the FS will be conducted using the same methods as the baseline risk assessment, therefore, no additional data or information is needed to assess long-term effectiveness." US DOE needs to provide a better explanation in the document why additional data will not be needed during the FS. How will US DOE compare sites, geology and potential exposures? Provide further explanation pertaining to that statement.

DOE Response: The intent was to state that because the streamlined risk assessment is qualitative, no additional quantitative data is required. However, all available information collected in support of the RI will be utilized, as appropriate, in the streamlined risk assessment. The PER provided justification for no additional data being needed for the streamlined risk assessment by utilizing existing human health and ecological risk evaluations performed at the Portsmouth site (see Waste Disposition PER Section 3.5). However, to clarify, the following new sentence has been added to the end of Section 3.1.5: "Additional data is being collected for WAC development and siting evaluation that can be used in the assessment of long-term risk of a potential OSDC."

21) Section 3.1.3, page 40: This section refers to US EPA and US DOE guidance to develop the SAPs. Revise Section 3.1.3 to reference any Ohio EPA guidance that is applicable.

DOE Response: Text revised as requested. (See response to comment 3.)

22) Section 3.1.5, page 40: The first sentence refers to "…provide information necessary to justify remedial action and support alternative development such that informed decisions can be made within the context of CERCLA." Revise to also refer to the DFF&O because decisions must be made in accordance with the DFF&O requirements.

DOE Response: The phrase "within the context of CERCLA" has been deleted and the requested text has been added to this sentence.

23) Section 3.1.5.4, Table 9, page 44: Revise the text to explain why short-term exposures for activities occurring during on-site transportation and placement of waste in such a cell, where there is a potential for dust to spread, discussed in this table are not included. Section 3.1.5.3 states that this potential exposure will be assessed. Table 9 should be a complete, thorough summary of assessments to be conducted. Revise Table 9 accordingly. Furthermore, exposures to workers handling waste to be disposed of in the on-site disposal cell should be included in the qualitative risk assessment. Revise the applicable section of text and CSM accordingly.

DOE Response: Table 9, which has been renumbered to Table 10, is a summary of the type of assessment to be performed, either qualitative or quantitative, for the receptors included in the conceptual site model (CSM), but not a list of pathways to be evaluated. That is found in the CSM. The CSM in Figure 16 indicates the exposure pathways (presented previously in the PER) associated with an on-site worker, on-site resident, off-site resident and off-site recreator, including dust inhalation, with the intent to evaluate these pathways associated with actions that are part of the on-site and off-site alternatives, including both long-term and short-term exposure in the alternatives evaluation. No change to the text required.

24) Section 3.1.6, page 45: This section mentions any waste that does not meet any OSDC WAC would be sent off site to "a US DOE approved facility." Revise this portion of Section 3.1.6 to indicate that the waste would be sent off site to a "US DOE approved facility that is authorized to accept such wastes."

DOE Response: Text added as requested.

25) Section 3.1.6, page 45: This section states: "Such a facility would only handle PORTS-generated waste (including any potential waste found outside the US DOE-owned PORTS reservation related to past PORTS operations)". As indicated in comment 7, off-Site wastes are not allowed to be shipped to the Site for disposal in a potential OSDC unless US DOE can demonstrate to Ohio EPA's satisfaction that: 1) the relationship of the waste to the Site justifies it being treated as part of the Site, as defined in the D&D DFF&O; and 2) treating it as part of the Site is in accordance with Section 104 of CERCLA. Pursuant to Section 104 of CERCLA, to treat facilities as one, US DOE would have to establish, at a minimum, that the sites are, in fact, "reasonably related on the basis of geography, or on the basis of the threat, or potential threat to the public health or welfare or the environment" as required by Section 104(d)(4). It is not clear that the relationship can be deemed reasonable simply because wastes, now located elsewhere, were generated at Portsmouth. Further, short term risks, such as those presented by transportation by truck or rail must also be assessed through the RI/FS process.

DOE Response: The referenced parenthetical statement has been removed from the document. As part of short-term effectiveness evaluation of the alternatives, transportation risks will be assessed as shown in Table 9 (renumbered to be Table 10).

26) Section 3.4, page 51 narrative and Figure 16: The DFF&O's require, "Each RI/FS Work Plan shall include a RI/FS project schedule, including identification of enforceable milestones, indicating critical path dependencies and including dates for the anticipated initiation, duration, and completion of each RI/FS task. The schedule shall also address field work and development and submittal of required deliverables.

a. Paragraph 13c of the DFF&O requires all RI/FS work plans to include "a proposed schedule that includes a completion schedule for each task and clearly identifies which task completion schedules are Milestones." Moreover, Table 1B requires that the Draft RI/FS Report be submitted "by the date established in the approved schedule in the concurred with RI/FS Work Plan." Furthermore, Table 1B requires the PP be submitted "within 90 days of receipt of the final concurrence with the RIFS Report. Therefore, the date of submission of the Waste Disposition RI/FS Report and the PP are Milestones per the DFF&O.

The Waste Disposition RI/FS Work Plan, Section 3.4 narrative, as well as Figure 16, indicate that the Waste Disposition RI/FS Report will be submitted "within 385 days following regulatory approval of the Work Plan" but does not identify this date as a Milestone. In fact, the narrative in Section 3.4 specifically states that "The dates shown in Figure 16 are for informational purposes only and are not intended to establish enforceable schedules or Milestones." Revise the Waste Disposition RI/FS Work Plan in its entirety to clearly refer to the date for submission of the Waste Disposition RI/FS Report as a Milestone.

b. Section 3.4, page 51: The narrative indicates the PP may be submitted concurrently with the RI/FS Report. Even so, the narrative should clearly identify that the PP is due within 90 days of receipt of concurrence with the RI/FS Report and that the date for PP submission is a Milestone.

c. Figure 16 shows several other items that are Milestones in the DFF&O and should be identified as such (i.e., PER and Waste Disposition RI/FS Work Plan, etc.). Revise Figure 16 accordingly. Revise the narrative and Figure 16 accordingly.

DOE Response: Section 3.4 has been revised to more clearly identify Waste Disposition Evaluation submittals, including highlighting those which constitute milestones. Further, Figure 16 has been deleted as agreed to in the comment resolution meeting.

27) Section 3.1.7, page 46: US DOE discusses the NEPA in the Waste Disposition RI/FS Work Plan. It should be made clear that, while NEPA is of interest to US DOE, it does not drive the decision-making process pursuant to the DFF&O. Revise the Waste Disposition RI/FS Work Plan accordingly.

DOE Response: NEPA values are required by the DFF&O (see Attachment A, Generic Statement of Work for Conducting Remedial Investigation(s) and Feasibility Study(ies), Section 9.0) to be considered and therefore will remain in the document. No change is made to the Work Plan.

28) Section 5.2, Table 11, page 56: Please make it clear whether the number of tests listed in the table is for each area and each geologic unit. For instance, the table states that area A had 3 hydraulic conductivity tests. Is this three tests total or three tests per saturated unit? If all three tests are in the same unit and there are three saturated units, this would be a data gap for that location that would need to be addressed.

DOE Response: The numbers in the table represent the minimum numbers of geotechnical and hydraulic conductivity tests per study area. If multiple saturated units are encountered within a study area, each unit will be tested. The text has been revised for clarity.

29) Section 5.2, Page 56: The text states that K_d factors will be calculated for uranium isotopes and technetium-99. K_d should also be calculated for VOCs as well.

DOE Response: Concur. The K_d for VOCs to be modeled for development of final draft analytical WAC in the RI/FS will be calculated using the site-specific fraction of organic carbon (collect during the current field effort) and literature values of the K_{oc}, as suggested.

30) Sections 6, 7, and 8, pages 59-63: These sections of the document require more detail. The Process Buildings and Complex Facilities Decontamination and Decommissioning Evaluation Project Remedial Investigation and Feasibility Study Work Plan and Pre-Investigation Report did not discuss sampling, but is relying on the documentation from this report to evaluate data needs and data gaps. Thus, additional detail is warranted in these sections of the document and must be consistent with the requirements of the DFF&Os Appendix B, Outline B-1. Furthermore, SAPs have already been developed and submitted for Ohio EPA review and concurrence as well as geotechnical sampling plans. Reference these documents and note where they would fit in this process.

DOE Response: Sections 6, 7, and 8 have been revised to include some detail from both the Process Equipment Characterization SAP and the Geotechnical SAP, with reference made to specific sections of the SAPs.

31) Section 8, page 63: The concept of investigation-derived wastes (IDW) applies to CERCLA field investigation activities only. The management of IDW must comply with regulatory requirements that are applicable or relevant and appropriate requirements (ARAR). This should be clarified in the RI/FS. Also, this paragraph should note that only D&D investigation derived waste will be considered to be part of the Site.

DOE Response: Section 3.2 (Federal, State, and Local ARARs and TBCs) has been modified to say that ARARs in Appendix B are also used to manage field activities, including IDW disposal.

32) The RI/FS SOW, Appendix B, Outline B-1, Section 3.2 requires that any Waste Disposition RI/FS Work Plan "identify existing Federal, State, and Local ARARs and TBCs that are anticipated to apply to field activities to be performed during the RI/FS, as well as ARARs that would apply to alternatives anticipated to be addressed in the RI/FS." Based upon the list of tasks identified, US DOE is required to identify ARARs for the anticipated Waste Disposition RI/FS field work. Revise the Waste Disposition RI/FS Work Plan to make it clear that ARARs will be identified for field work, as well as for the anticipated alternatives.

Revise the Waste Disposition RI/FS Work Plan to identify ARARs for field work. See, for example Sections 3.1.1.5 and 3.2 of the Waste Disposition RI/FS Work Plan.

DOE Response: The primary focus of field work will be to collect geochemical and geotechnical sampling data related to siting and WAC development and process building data to support waste quantity and nature refinement. The ARARs that apply to these types of activities are the ARARs listed in Appendix B tables under the headings of Waste

Characterization, Management, Storage, Treatment, and Disposal. Text was added to Sections 3.1.1.5 and 3.2 to discuss the fact that these ARARs also apply to field work activities and to refer the reader to the Appendix B ARAR tables.

33) Preliminary Site Screening for an On-Site Disposal Cell. Section A.2 and Table A.1 should demonstrate that the requirements set forth in OAC 3745-50-38 have been met. Refer to comment 39 below.

DOE Response: Section A.2 is a summary of the historical screening performed for multiple sites in 2003 (reference BJC 2003). Therefore, applying the referenced requirement to that completed study would be inappropriate. A new statement has been added to Section A.2 clarifying this point and to indicate these screening efforts occurred before issuance of the DFF&O. The site or sites carried into the feasibility study may consider these requirements as agreed to between DOE and Ohio EPA.

34) Table A.1, page A-10: This table lists the criteria used to evaluate 16 different locations for the OSDC. A column needs to be added that specifies where the criteria used in the screening process came from. In other words, specify the ARAR that requires the listed criteria (TSCA, Solid Waste Rules OAC 3745-27-06(B)(2), etc.).

Also, Siting Criteria in OAC 3745-27-07(H) should be accounted for when siting potential locations for the OSDC. Revise this Table and applicable text accordingly.

DOE Response: The site screening criteria presented in Table A.1 were established during the site screening evaluation performed in 2003 (reference BJC 2003). This text merely summarizes an earlier document that was completed without consideration of the issues raised in the comment. No changes are made to the summary but a new statement was added to Section A.2. See response to comment 33.

35) Section A.3.2., page A-12: This section mentions that Study Area C is the ARAR-compliant site. Is this the same as Area 3? Similarly, is Study Area A the same as Area 2? If they are the same, it would help to have the references the same wherever they are used in the Waste Disposition Work Plan.

DOE Response: Appendix A text has been revised to provide reference to the previous study area designations for clarity.

36) Section A.4, paragraph 2, page A-14: This section discusses how decisions will be made. Revise to include DFF&O requirements as part of the Siting analysis.

DOE Response: DOE is committed to including DFF&O requirements, especially compliance with siting ARARs, in the siting analysis and alternative development. ARAR discussions are currently underway with Ohio EPA. The resultant details will be incorporated in the RI/FS.

37) Section A.5, page A-15: This section minimizes Ohio EPA's role in the review process. Revise this Section to discuss Ohio EPA's role pursuant to the DFF&O. Specifically, Ohio EPA provides more than just input. Ohio EPA reviews submissions for concurrence or approval, as applicable, as set forth in the DFF&O.

DOE Response: Section A.5 has been revised to incorporate additional text referring to Ohio EPA's regulatory role pursuant to the DFF&O.

38) Appendix B, Section B.1. Introduction: The paragraph referring to CERCLA 121(e) CERCLA needs to be revised to quote paragraph 9a of the DFF&O instead.

DOE Response: Text has been revised as requested.

39) Appendix B.4.2. Reference is made to "DOE order" as an ARAR. Rephrase this so as not to be confused with Administrative Orders, Judicial Orders, etc., which are legally binding on DOE but that are not ARARs.

DOE Response: Text has been revised for clarity.

40) Appendix B.4.2 refers to waste water and NPDES issues. Remove any language from this ARARs discussion that is related to any existing waste water or NPDES permits. This discussion should point out that it does not cover existing waste water or NPDES permits. Any anticipated new outfalls that are not covered by the existing permits may be discussed here in terms of ARARs that would apply.

DOE Response: Text has been removed as requested.

41) Appendix B.4.2 refers to the fact that US DOE expects that a "CERCLA waiver" may be sought depending on the candidate site chosen. Specify which sites US DOE is referring to, as well as more detail on what requirement US DOE thinks may need to be waived and on what basis.

DOE Response: TSCA specifies that the bottom of the landfill liner must be located 50 ft above the historical high groundwater mark and must prohibit any hydrologic connection between the site and any surface water, 40 *CFR* 761.75(b)(3). If the on-site waste disposal alternative is selected, a waiver in accordance with the DFF&O and consistent with CERCLA Sect. 121(d)(4)(D) and 40 *CFR* 300.430(f)(1)(ii)(C) may be needed for the TSCA requirement that the bottom of a landfill liner be 50 ft above the historical high groundwater table. Study Area C may be able to meet the TSCA 50 ft. requirement and would not need a waiver. Data is being collected to determine if Site D can meet these ARARs. As discussed and agreed to in the comment resolution meeting, there is not enough data available at this time, however, to provide any more details.

42) Appendix B.4.3 refers to "CERCLA waste." The last sentence, at a minimum, should be changed to refer to "D&D waste".

DOE Response: Text has been revised as requested.

43) Appendix B, Table B.1: US DOE must modify the ARAR table to include:

- ORC Chapter 6111 references, including the rules promulgated there under
- ORC Chapter 3714 references, including the rules promulgated there under
- OAC Chapter 3745-27
- ORC 6111.02 to 6111.028 references, including the rules promulgated there under
- 3745-1-50
- 3745-1-04
- 3745-1-32
- 3745-1-43

- 3745-1-07
- 3745-32
- 3745-50-38
- 3745-52-34(A)(1)(e)
- 3745-52-34(A)(4)
- 3745-52-34(C)(1)(a)
- 3745-52-34-(C)(2)
- 3745-52-34(M)
- 3745-54-14(B) and (C)
- 3745-54-15(B)(3)(4)
- 3745-54-15(D)
- 3745-54-97(I)(J)
- 3745-54-90(A)
- 3745-54-91 through 3745-54-94
- 3745-54-96
- 3745-54-99
- 3745-54-100
- 3745-55-12 – 3745-55-13
- 3745-55-17(B)(C)(D)
- 3745-55-18 – 3745-55-20
- 3745-55-95
- 3745-55-97(C)
- 3745-57-03(A) should be removed
- 3745-57-05(C)(1) should be removed
- 3745-57-06
- 3745-57-09
- 3745-57-14(E)
- 3745-57-72
- 3745-270-07(B)
- 3745-270-45(D)(2)(3)(4)(5)
- 3745-273-33(C)(3)(4)
- 3745-400-05(B)

DOE Response:

The following ARARs were already in Table B.1:

- 3745-57-06 [listed under "Response actions for RCRA leachate detection system"]
- 3745-57-09 [listed under "Inventory requirements"]
- 3745-57-72 [listed under "Corrective Action Management Units"]
- 3745-270-45(D)(2) through (4) [3745-270-45(D)(5), however, was added]

The following ARARs were added to Table B.1 in Appendix B:

- ORC 6111.04
- ORC 6111.07
- ORC 6111.021-028
- 3745-27-13(A)

- 3745-1-54(B)(1)
- 3745-1-51 through -54
- 3745-32-05
- 3745-50-38(A)(7)
- 3745-1-04
- 3745-1-09
- 3745-1-15
- 3745-1-07 [Citation was already in table as 3745-1-07(C); modified to 3745-1-07]
- 3745-52-34(A)(1)(e)
- 3745-52-34(A)(4)
- 3745-52-34(C)(1)(a)
- 3745-52-34(C)(2)
- 3745-52-34(M)
- 3745-54-14(B) and (C)
- 3745-54-15(B)(3) and (4)
- 3745-54-15(D)
- 3745-54-97(I) and (J)
- 3745-54-90(A)
- 3745-54-91 – 3745-54-100
- 3745-55-12
- 3745-55-17(B) and (D) [(C) was already in the table)]
- 3745-55-18
- 3745-55-95
- 3745-55-97(C)
- 3745-57-14(E)
- 3745-270-07(B)
- 3745-273-33(C)(3) and (4)
- 3745-400-05(B)

<u>The following ARARs were not added to Table B.1 in Appendix B</u>:

- 3745-1-50 This is administrative; consists only of definitions.
- 3745-1-43 This citation could not be found in the Ohio regulations.
- 3745-1-32 These are water quality standards for the Ohio River; DOE is not discharging to the Ohio River. OAC 3745-1-09 (Scioto River drainage basin) and 3745-1-15 (Little Beaver Creek drainage basin) standards were added instead because these are the basins into which PORTS surface waters drain.
- 3745-55-13 This citation could not be found in the Ohio regulations
- 3745-55-19 and 3745-55-20 These are administrative, not environmental protection regulations, and will be considered as institutional/land use controls during the PP/ROD stage.
- 3745-50-38(B) Ohio EPA requested that 3745-50-38 be added to the Table B.1. The substantive siting requirements of 3745-50-38(A) were added but not 3745-50-38(B)(2) because DOE believes the requirements under 3745-50-38(B)(3) for exemption from the (B)(2) criteria are met. Specifically, the siting limitations in (B)(2) are not necessary because: (a) of the nature and volume of the waste and the manner of management applied (the volume of toxic organic waste in the OSDC wastestream is estimated to be far less than 250,000 gallons and will be appropriately managed to prevent releases to air, water, or soil); (b) the facility will impose no substantial danger to the health and safety of persons

occupying the structures listed in (B)(2) since the remedy selected under the DFF&O and CERCLA must by law protect human health and the environment; and (c) the facility will not be located in an area where activities will be incompatible with existing or future land uses.

Ohio EPA requested that the following ARARs be removed from Table B.1:

- 3745-57-03(A) This was not removed because OAC 3745-57-03(C)(1)(b), which is cited in the table under "Liners and leachate collection design for a RCRA landfill" states that liners must comply with "paragraphs (A)(1)(a), (A)(1)(b), and (A)(1)(c) of this section" which is referencing 3745-57-03(A). Thus, these standards apply to the liners and need to remain in the table.
- 3745-57-05(C)(1) Because this citation has been deleted from Ohio's regulations, it has been deleted from Table B.1. The corresponding federal citation, however, which has not been deleted from the *CFR*, remains in Table B.1.

Please note that at this stage of the process, the ARARs are meant to generally identify requirements that apply to waste management and waste cell operations. Further, the DFF&O states that "…the ARARs for the Site-Wide Waste Disposition Evaluation project will be further developed and refined during performance of the RI/FS as the potential remedial alternatives are defined and finalized...and…included in the final RI/FS Report". Therefore, until more detailed discussions between DOE and Ohio EPA are held and decisions made about which elements of the requested regulations are ARAR, the ARARs table in the Work Plan has not been modified to include solid waste regulations in 3745-27 [other than 3745-27-13(A), which applies also to hazardous waste facilities, and sections of 3745-27-02, -03 and -05 banning illegal storage disposal of solid waste and prohibiting open dumping of solid waste] and those in 3714. The work plan ARARs are considered draft.

44) The table of ARARs is not complete. Appendix B, Table B.2: US DOE must modify the ARAR table to include:

- ORC 6111.04
- ORC 6111.07
- 3745-270-07
- 3745-270-09
- 3745-273-33(B)(C)
- 3745-273-34(A)(C)(E)
- 3745-273-35(A)
- 3745-273-38(A)(D)(E)

DOE Response:

The following ARARs were added to Table B.2 in Appendix B:

- ORC 6111.04
- ORC 6111.07
- 3745-273-33(B) and (C)
- 3745-273-34(A) and (C)

The following ARARs are already in Table B.2 in Appendix B:

- 3745-270-07 (see sixth and seventh row under Waste generation, characterization, and segregation)
- 3745-270-09 (see eighth row under Waste generation, characterization, and segregation)
- 3745-273-34(E)
- 3745-273-35(A)
- 3745-273-38(A) and (D) and (E) (see off-site transport of universal waste; requirements section includes these citations)

45) The ARAR table makes reference to items that, while legally binding on US DOE, are not ARARs. Ohio EPA's suggestion is to create a separate section in the RI/FS Work Plan, prior to the ARARs discussion, that lists out existing permits, licenses, authorizations, and orders and indicate that if activities fall within the "jurisdiction" or "reach" of any of these documents, US DOE is required to and will comply with the documents. Revise the ARARs table and narrative consistent with the comments herein, including but not limited to the following:

a. Delete the row entitled "Storage of RCRA hazardous waste" and its attendant boxes. The document identifies the Ohio hazardous waste installation and operation permit (erroneously identified as "RCRA Part B Storage Permit") as a "TBC". This is incorrect. Additionally, the language in the "Requirements" box, conflicts with the language in the attendant footnote "c". Footnote c, found on p. B-79, it states: "The reference in Table B.1 to the Portsmouth Gaseous Diffusion Plant (PORTS) RCRA Part B Storage Permit No. 04-66-0680 for –Storage of RCRA hazardous waste is intended only to reflect that DOE must comply with the requirements of the RCRA Part B Storage Permit for the storage of any hazardous wastes generated by the Waste Disposition project that US DOE stores in the permitted RCRA hazardous storage area." The permit is not an ARAR, insofar as it only applies to hazardous waste which is stored within the permitted area, and should be removed from the listing of ARARs. The narrative text may reflect that if the permitted storage area under the Ohio hazardous waste installation and operation permit is utilized, the waste will be managed under all the terms and conditions of the permit.

b. The substantive requirements of any permit that US DOE would be required to obtain, but for paragraph 9a of the DFF&O, must be noted in the ARAR table.

c. Table B.2, footnote (c) page B-105 needs to be removed.

DOE Response:

a. The Hazardous Waste Installation and Operation Permit has been removed from the ARARs table. The following sentence has been added to the main text of the report: "Hazardous waste stored in the RCRA-permitted storage areas will comply with the terms and conditions of the permit." A new section (3.1.1.8) titled "Identification of Existing Obligations" has been added to discuss existing permits.

b. The second paragraph of the Introduction to the ARARs appendix explains that on-site actions must comply with the substantive requirements of a regulation and that no permits are required.

c. The footnote has been removed as requested.

46) Table B.1, Page B-33: Closure of a landfill, Closure of a RCRA landfill. The most recent version of the Closure Plan Review Guidance (CPRG) should also be listed as a TBC for designing the final cover for the OSDC. The final cover of the OSDC should comply with the critical design elements described in Appendix G of the CPRG. Revise this table accordingly.

DOE Response: This guidance document will be referenced in the RI/FS, but not as a TBC in the Appendix B ARARs.

47) Table B.1, Page B-75: Closure, Closure Performance Standard for RCRA hazardous waste management units. The most recent version of the Closure Plan Review Guidance (CPRG) should be cited as a TBC. The CPRG provides guidance on how to demonstrate compliance with the Closure Performance Standard for RCRA. US DOE will be required to implement an environmental covenant which restricts the land use, excavation, and construction of a structure on the unit as part of Closure. The most recent version of the CPRG available is dated 2009. However, this guidance document is currently under revision, so when a revised, updated document is made available, it will supersede the 2009 CPRG. Revise this table accordingly.

DOE Response: See response to comment 46.

48) Footnote b, page B-79: This footnote states in part the following: "Section 104(d)(4) allows the lead agency to manage waste transferred between such noncontiguous facilities without having to obtain a permit. Under this authority, an on-site disposal facility and any noncontiguous Portsmouth sites contaminated by past operations where future CERCLA response actions will generate waste requiring disposal at the on-site facility would be considered as a single on-site unit for response purposes and movement of wastes between them would be considered on-site transportation." As indicated in comment 7, off-site wastes are not allowed to be shipped to the Site for disposal in a potential OSDC unless US DOE can demonstrate to Ohio EPA's satisfaction that: 1) the relationship of the waste to the Site justifies it being treated as part of the Site, as defined in the D&D DFF&O; and 2) treating it as part of the site is in accordance with Section 104 of CERCLA. Pursuant to Section 104 of CERCLA, to treat facilities as one, US DOE would have to establish, at least that the sites are, in fact, "reasonably related on the basis of geography, or on the basis of the threat, or potential threat to the public health or welfare or the environment." It is not clear that the relationship can be deemed reasonable simply because wastes, now located elsewhere, were generated at Portsmouth. Further, short term risks, such as those presented by transportation by truck or rail must also be assessed through the RI/FS process.

DOE Response: The phrase "would be considered" will be changed to "may potentially be considered" and, if DOE decides to consider this option further during the RI/FS, all of these considerations will be evaluated and discussed with Ohio EPA. Also, transportation risks will be assessed in the FS.

Appendix C Comments
General Comment:

The WAC work plan, as submitted, does not seem to address the requirement that the WAC include standards for waste characterization. The Work Plan must include tasks that will define the appropriate standards for waste characterization, including but not limited to, the number and locations of samples necessary and the sampling protocol required for each waste stream.

DOE Response: As discussed during the technical exchange meeting held August 16, 2011 between DOE and Ohio EPA technical representatives, the preliminary WAC principally

focused on the development of radioisotope and chemical analytical WAC. Further, it was agreed that all comments received from the Ohio EPA regarding the preliminary analytical WAC, as well as other WAC defined in the DFF&O, will be incorporated into the draft WAC developed during the Waste Disposition Evaluation process. Nevertheless, text has been added to Appendix C to introduce the concepts for the waste evaluation and characterization WAC as defined in the DFF&O.

49) Section C.1.3., Page C-8 and Section 3.1 page C-11: Section 1.3 states that post-closure care will last 30 years whereas Section 3.1 states that the compliance period is 1,000 years. At least 30 years of post-closure care is required by OAC 3745-55-15 (A)(1). In Section C.3.1, the text states, "the 1,000-year time of compliance is consistent with DOE Manual 435.1-1, "Radioactive Waste Management," which requires DOE to demonstrate with reasonable expectation that members of the public will be protected for 1,000 years after closure of a LLW disposal facility (DOE 2001)." This statement, while not a direct quote of Paragraph 14 of the DFF&O, is consistent with Paragraph 14 of the DFF&O. Since any such OSDC will contain mixed wastes, the document needs to be revised to clarify these different compliance periods so that they are understandable to the public. In addition, statements regarding "environmental media" should be qualified by the statement that the required exemptions have not yet been acquired to allow disposal of this waste stream on site.

DOE Response: Text has been added to Sections C.1.3 and C.3.1 for clarity, as requested.

50) Section C.3.3.1, page C-15: The CSM needs to be revised to reflect the new location of the OSDC. The text in this section lists the saturated units present beneath PORTS. The Minford is also partially saturated with the water table occurring within the Minford between 10 to 15 feet in depth. Also the text states that there are glacial tills at PORTS. This is incorrect. Also, the Sunbury should be mentioned in this text since it occurs between the Gallia and Berea formations in areas of the site.

Also, a cross section of the unit with the actual geology beneath is needed. The cross section should show the location of the modeled compliance points and from which unit the wells are receiving ground water.

DOE Response: Appendix C has been revised to incorporate Study Area D as a final candidate site for the location of the potential OSDC, including both text and figures as appropriate. Note that the CSM depicted in Figure C.4 is a simplistic representation of the migration of constituents present in waste disposed in a conceptual above-grade disposal facility to a point of assessment (i.e., receptor location) for preliminary analytical WAC development only. This simplistic CSM allows for the models used (i.e., PATHRAE-RAD and PATHRAE-HAZ) to calculate preliminary analytical WAC to be applied similarly for all final candidate sites to meet the specific purposes discussed in Section C.1.2. Calculation of final analytical WAC will utilize more specialized models, as discussed in *Work Plan for Modeling Analysis in Support of Regulatory Decisions at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio* (DOE/PPPO/03-0253), utilizing model input parameters that are agreed to between DOE and Ohio EPA that better depict the likely migration flow paths through the associated geology.

51) Section C.3.1, page C-11: The text states, "The POA for calculating the preliminary analytic WAC is the current COE property boundary. Use of the property boundary as the POA is justified since there are no current or future plans for US DOE to shrink the footprint as there are closed waste disposal facilities located across the site containing radioactive waste that must be managed for as

long as the waste presents a hazard." The POA is not the same concept as a point-of-compliance (POC). POA is the point where a hypothetical receptor resides and performance-based modeling is performed to demonstrate protection of human health and the environment into the future. The POC will be the vertical limit of waste near the edge of the OSDC boundary. Protection of human health and the environment is assured at the POC through rigorous monitoring, surveillance and maintenance of the OSDC and the commitment by US DOE to perform corrective actions if required. These commitments are key tenets of RCRA Subtitle C hazardous waste disposal programs as well as US DOE Order 458.1 'Radiological Protection of the Public and the Environment'." Use of the property boundary as the POA as proposed is not appropriate for the development of the WAC.

a. OAC 3745-27-07(H)(4)(b), which is relevant and appropriate to the siting of an OSDC for the disposal of D&D and hazardous waste, requires a 300 ft property buffer. Since portions of the property will eventually be parsed out for redevelopment once D&D and Corrective Action are complete, the design of the OSDC should provide a property buffer of 300 ft. Furthermore, hazardous waste closure requires that groundwater meet unrestricted potable use standards at the property boundary. Therefore, the WAC should be developed in order to meet unrestricted potable use standards at 300 ft from the unit boundary with the unit boundary being the POC. If an MCL is not available for a constituent, then a risk-based standard would need to be calculated using default residential exposure factors for exposure to groundwater and the most current toxicity values available.

DOE Response: As discussed in the technical exchange meeting held August 16, 2011, draft analytical WAC developed during the Waste Disposition Evaluation process will be based on the agreed to POC, including 300 ft. downgradient from the OSDC and meeting maximum contaminant levels (MCLs) or other agreed to limits at the downgradient edge of the limits of waste for the OSDC. Further, it was agreed that no changes are required to Appendix C.

52) Figures C.7, C.9, C.11: These figures appear to present the modeling results of the release from the OSDC. However, this is not clear. The reader would assume that the yellow area is the modeled release from the unit. The legend of these figures needs to explain what the yellow area is. In Figure C.7, if the yellow area is the contaminant plume from the OSDC, why were the compliance points placed to the west of the release? GW-1 and GW-2 should be placed to the east and southeast of the unit to evaluate the time of contaminants reaching these points.

DOE Response: Figures C.7, C.9, and C.11 have been revised for clarification, including any required legends.

53) Section C.3.1, page C-12: The text states, "The resident farmer exposure scenario provides a reasonable case to assess exposure to media potentially impacted as a result of migration of the modeled analytic WAC values from an OSDC through the following pathways:

- Ingestion of contaminated water – using water from a groundwater well
- Inhalation of volatiles while showering – using water from a groundwater well
- Dermal exposure while showering – using water from a groundwater well
- Consumption of homegrown vegetables/fruits irrigated with contaminated surface water
- Consumption of meat from cattle fed on vegetation irrigated with contaminated surface water."

Ohio EPA requires further information pertaining to this approach of determining and modeling the analytic WAC as follows:

a. Since the WAC would have to be developed to meet unrestricted potable use standards, the exposure scenario used to assess exposures to contaminated groundwater would have include a child receptor. The assessment discussed in this document for resident farmer appears to only assess adult exposure. Revise the document and WAC assessment to incorporate an evaluation of a child receptor.

b. US DOE does not discuss how these exposure pathways pertain to the modeling presented in the Attachment to Appendix C. It is not clear how these pathways were evaluated in the modeling of the WAC.

c. There are no exposure factors discussed or presented in the document for several of the pathways discussed in the Work Plan and there are several substantial information gaps. US DOE should add references to the document "Methods for Conducting Human Health Risk Assessments" to note that the information necessary to develop the pathways is currently being considered and the appropriate values will be provided upon Ohio EPA approval of the final document.

DOE Response:

a. As discussed in the technical exchange meeting held August 16, 2011, draft analytical WAC developed during the Waste Disposition Evaluation process will be based on meeting maximum contaminant levels (MCLs) or other agreed to limits at the downgradient edge of the limits of waste for the OSDC. This approach is protective of a child receptor per the Ohio EPA risk assessment subject matter expert. Further, it was agreed that no changes are required to Appendix C.

b. As agreed in the technical exchange meeting held August 16, 2011, details presented and discussed regarding exposure factors selected for modeling preliminary analytical WAC presented in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that no changes are required to Appendix C.

c. As agreed in the technical exchange meeting held August 16, 2011, details presented and discussed regarding exposure factors selected for modeling preliminary analytical WAC presented in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that draft analytical WAC to be developed during the Waste Disposition Evaluation process will utilize exposure factors consistent with *Methods for Conducting Human Health Risk Assessments and Risk Evaluations at Portsmouth Gaseous Diffusion Plan, Piketon, Ohio* (DOE/PPPO/03-0127). A reference to this document has been added to Appendix C.

54) Section C.3.2, page C-12: The text states, "The leachate collection system is assumed to be fully functional for the first 30 years following final closure." Leachate collection and other post-closure requirements, such as groundwater monitoring, may be required for more than 30 years. Pursuant to OAC 3745-55-17(A)(2), at any time preceding partial closure of a hazardous waste management unit subject to post-closure care requirements or final closure, or any time during the post-closure period for a particular unit, the director may, in accordance with the permit modification procedures in rules 3745-50-40 to 3745-50-235 of the Administrative Code, extend the post-closure period applicable to the hazardous waste management unit of facility if he finds that the extended period is necessary to protect human health and the environment (e.g., leachate or groundwater monitoring results indicate a potential for migration of hazardous wastes at levels which may be harmful to

human health and the environment). Revise text to state the leachate collection system will be fully functional for at least 30 years of post-closure care. The text in this Section should also be revised to state that US DOE must demonstrate that no further post-closure care is warranted when the 30 year post-closure care period is due to expire, otherwise the post-closure care period may be extended in accordance with OAC 3745-55-17(A)(2)(b).

DOE Response: The text has been revised to state that the leachate collection system is assumed to be fully functional for at least 30 years following final closure. While DOE acknowledges that the leachate collection system may require maintenance beyond 30 years, the assumption of 30 years is merely used to establish the performance period assumed for preliminary analytical WAC development in the Waste Disposition RI/FS Work Plan. The text suggested above will be included in the alternative description for on-site disposal in the feasibility study.

55) Section C.3.2, page C-12: The text states, "Preliminary analytic WAC are calculated for a specific set of contaminants or potential concern currently identified for the PORTS site." A WAC value should be developed for every constituent that would potentially be disposed of within the OSDC, including those constituents that would be expected to be present in other disposal units on the PORTS site.

DOE Response: As discussed during the technical exchange meeting held August 16, 2011, the preliminary analytical WAC were calculated for a limited number of constituents to provide analysis specific to the purposes described in Section C.1.2. Further, it was agreed that the draft analytical WAC to be developed during the Waste Disposition Evaluation process will be calculated for all constituents consistent with those presented in *Methods for Conducting Human Health Risk Assessments and Risk Evaluations at the Portsmouth Gaseous Diffusion Plant* (DOE/PPPO/03-0127). It was agreed that no changes are required to Appendix C.

56) Section C.3.3, Page C-14. The text states, "A total cover thickness is 15 ft., including a 3 ft biointrusion layer that is sufficient to prevent inadvertent intrusion into the waste during construction of a house with a basement." The final cover for the OSDC should comply with rules OAC 3745-57-10(A)(1) through OAC 3745-57-10(A)(5) and the critical design elements discussed in Appendix G of the CPRG. The calculation of the preliminary analytic WAC should assume the minimal requirements for the critical design elements discussed in Appendix G of the CPRG in order to provide appropriate conservatism. Ohio EPA recommends developing the preliminary analytic WAC assuming a final cover following the specifications for Ohio EPA's Recommended Design Solution for a RCRA final cover (see page G-4 of the CPRG). Also, construction of a structure, especially a house, should not be permitted on the final cover. Since closure of the OSDC would consist of closure with waste in place, DOE would be required to comply with Rule OAC 3745-27-13, which prohibits filling, grading, excavating, building, drilling, or mining on land where a hazardous waste facility was operated. DOE will be required to implement an environmental covenant that restricts the land use, excavation, and construction of a structure on the unit as part of closure. Revise this section of the text and preliminary analytic WAC accordingly.

DOE Response: As discussed during the technical exchange meeting held August 16, 2011, the cap presented in Appendix C is for a conceptual OSDC that establishes the various layers and hydraulic properties used in the calculation of preliminary analytical WAC. Further, it was agreed that the draft analytical WAC developed during the Waste Disposition Evaluation process will be based on engineering assumptions, including those for the cap and liner, as well as the hydraulic properties of the surrounding geology, consistent with detailed OSDC

design and measured site properties, respectively. It was also agreed that no changes are required to Appendix C.

57) Section C.3.3.1, page C-15: The CSM needs to be revised to reflect the new location of the OSDC. The text in this section lists the saturated units present beneath PORTS. The Minford is also partially saturated with the water table occurring within the Minford between 10 to 15 ft in depth. Also, the text states that there are glacial tills at PORTS. This is incorrect. Also, the Sunbury should be mentioned in this text since it occurs between the Gallia and Berea formations in areas of the site.

DOE Response: Repeated comment. See response to Comment #45.

58) Section 4.3, Page C.27 and Section 4.4.1 Page C.29: On page C.27 the text states that additional field studies in Area C will confirm if there are substantial fissures beneath this location. Page C.29 provides text that states the modeling of Area C was based on the assumption that the shale is contiguous at a depth of 80 ft with a very low hydraulic conductivity throughout. These two pages seem to contradict each other. US DOE needs to determine whether the unit is fractured prior to modeling Area C as having no fractures. Future reports should not make such assumptions.

DOE Response: As discussed in the technical exchange meeting held August 16, 2011, the presence of fractures in the shale is being investigated in accordance with the *Geotechnical Sampling and Analysis Plan for the Sitewide Waste Disposition Evaluation Project at the Portsmouth Gaseous Diffusion Plan, Piketon, Ohio* (DOE/PPPO/03-0193). Further, calculation of the preliminary analytical WAC assumed that the weathered shale would be removed and that the remaining shale was competent. As agreed, the draft analytical WAC to be developed during the Waste Disposition Evaluation process will be based on the site-specific hydrogeologic and geotechnical data collected with appropriate assumptions included in the modeling. It was also agreed that no changes are required to Appendix C.

59) Figure C.11, page C-30: The text needs to explain why Study Area C did not include modeling of an on-site groundwater well. Areas A and B had two wells modeled but Area C only one well location was modeled. The text must explain differences such as this.

a. Attachment to Appendix C – Revise this attachment as necessary to provide the detail and printouts needed for Ohio EPA to adequately review the modeling effort.

DOE Response: Text has been added to explain the reason for including only one POA (i.e., one groundwater well) for Study Area C.

a. Model input and output files were provided to Ohio EPA subject matter experts at the technical exchange meeting held August 16, 2011. It was agreed that detail presented and discussed regarding the preliminary analytical WAC modeling performed in the Waste Disposition RI/FS Work Plan adequately addressed this comment. It was also agreed that no changes are required to Appendix C.

60) Section C.4.4.2, Table C.2 through Table C.6, Pages C-31 through C-34: These tables should list all the constituents included in Table 3 on Page B-17 in Appendix B of the Methods for Conducting Human Health Risk Assessments and Risk Evaluations at the Portsmouth Gaseous Diffusion Plant. Revise these tables accordingly.

DOE Response: As discussed during the technical exchange meeting held August 16, 2011, the preliminary analytical WAC calculations were performed for a limited number of constituents. Further, it was agreed that the draft analytical WAC to be developed during the Waste Disposition Evaluation process will be calculated for all constituents consistent with those presented in *Methods for Conducting Human Health Risk Assessments and Risk Evaluations at the Portsmouth Gaseous Diffusion Plant* (DOE/PPPO/03-0127). It was also agreed that no changes are required to Appendix C.

61) Table 1, page C-47: This table lists the layers of the OSDC as used in the HELP model. Layers 5 and 12 are given as clay/GCL with a total thickness of 4.24 in. and a conductivity of 3.53E-8 cm/sec. What does this mean? Is it a combination of a clay layer with a GCL under it or a single layer that combines properties of the two? These layers need to be properly identified.

DOE Response: As agreed in the technical exchange meeting held August 16, 2011, details presented and discussed regarding parameters used in the HELP modeling for preliminary analytical WAC performed in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that no changes are required to Appendix C.

62) Attachment, Page C-48: MODFLOW/MODPATH Models. The text states, "MODFLOW simulations, based on the conceptual disposal cell design and future site conditions, were conducted to predict future groundwater level and flow regime for each study area using the constructed site-specific flow models." Why aren't the inputs and results of these simulations presented in this Attachment? US DOE should provide all supporting information used in the models used to develop the preliminary analytic WAC. Provide a table displaying the inputs used in the MODFLOW simulations, revise the text in this attachment to discuss the inputs used and the results of the model, and include printouts of the input/output of the model.

DOE Response: Model input and output files for the preliminary analytical WAC modeling were provided to Ohio EPA subject matter experts at the technical exchange meeting held August 16, 2011. Detail presented and discussed regarding the MODFLOW and MODPATH models for preliminary analytical WAC presented in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that no changes are required to Appendix C.

63) Attachment, Table 3, Page C-49: Input Parameters for PATHRAE. Ohio EPA has the following concerns regarding the parameters displayed in Table 3 and recommends the use of the following parameters for modeling purposes:

a. Cover thickness: Ohio EPA recommends using a cover thickness of 54 in. (30-in. protection layer, plus 24-in. low permeability compacted clay layer) based on the critical design elements discussed in Appendix G of the CPRG, which is equivalent to 1.4 meters.

b. Bulk soil density: How was this input parameter selected? Is this based on site-specific geotechnical data? If so, the supporting data should be included or at least referenced in this document. Ohio EPA recommends a default bulk soil density of 1.5 kg/L, which is the default bulk soil density used for calculating soil screening levels for migration to groundwater, if there is not appropriate geotechnical data to support the use of a site-specific value.

c. Vadose zone porosity: How was this input parameter selected? Is this based on site-specific geotechnical data? If so, the supporting data should be included or at least referenced in this document. Ohio EPA recommends a default soil porosity of 0.43, which is the default total soil

porosity used for calculating soil screening levels for migration to groundwater, if there is not appropriate geotechnical data to support the use of a site-specific value.

DOE Response:

a. As discussed during the technical exchange meeting held August 16, 2011, the clay layer in the OSDC cap was based on a conceptual OSDC only. As agreed, the draft analytical WAC developed during the Waste Disposition Evaluation process will be based on engineering assumptions of the OSDC, including those for the cap, consistent with detailed OSDC design. It was also agreed that no changes are required to Appendix C.

b. Model input and output files for the preliminary analytical WAC modeling were provided to Ohio EPA subject matter experts at the technical exchange meeting held August 16, 2011. Detail presented and discussed regarding the assumption for bulk density selected for preliminary analytical WAC modeling performed in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that no changes are required to Appendix C.

c. Model input and output files for the preliminary analytical WAC modeling were provided to Ohio EPA subject matter experts at the technical exchange meeting held August 16, 2011. Detail presented and discussed regarding the assumption for porosity selected for preliminary analytical WAC modeling performed in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that no changes are required to Appendix C.

64) Attachment, Method of Risk and Dose Assessment, page C-52: The text states, "PATHRAE calculations were performed to determine the equivalent annual water consumption per year for the creek [defined as the Equivalent Uptake (EU)]. This equivalent uptake water consumption is derived by scaling the use of creek water for drinking and agricultural purposes to an equivalent annual drinking water ingestion that would give the same annual constituent uptake as calculated to come from all water-based pathways." How was the EU calculated? US DOE should provide all assumptions, equations, and supporting information for all model calculations. Revise this section of the text to elaborate on how the EU was determined. Provide the equation used to calculate the EU in this section of the text. US DOE should also create a table to present all of the parameters and assumptions used in the calculation of the EU.

DOE Response: Specifics regarding the PATHRAE modeling process used for the preliminary analytical WAC modeling were discussed with Ohio EPA subject matter experts at the technical exchange meeting held August 16, 2011. It was agreed that the detail presented and discussed regarding the parameters selected for preliminary analytical WAC modeling performed in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that no changes are required to Appendix C.

65) Attachment, Method of Risk and Dose Assessment, page C-52: The text states, "The calculated dilution factors (DFs) for the creek and residential well were used for scaling the constituent concentrations in the creek to corresponding well concentrations." The text in this section adequately describes how each of the DFs was determined. However, the values and parameters used to develop the DFs are not provided. US DOE should clearly present all values, assumptions, and parameters used in the calculation of the DFs. Revise this section of the document to include a table that presents all of the parameters used to determine each of the DFs.

DOE Response: Specifics regarding the PATHRAE modeling process used for the preliminary analytical WAC modeling were discussed with Ohio EPA subject matter experts at the technical exchange meeting held August 16, 2011. It was agreed that the detail presented and discussed regarding the PATHRAE modeling performed for preliminary analytical WAC in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that no changes are required to Appendix C.

66) Attachment, Method of Risk and Dose Assessment, page C-52: The text states, "The peak effective risk or dose was calculated as the risk or dose due to ingestion of 730 l/yr. per year of water drawn from the well, plus the consumption of agricultural products and livestock irrigated or watered with the creek surface water." US DOE should specify that the assumption of an ingestion rate of 730 l/yr. is based on a default water ingestion rate of 2 L/day for a residential exposure scenario. Revise the text accordingly. Also, there is no information provided regarding the other routes of exposure discussed in Section of the document. How does inhalation of volatiles from groundwater and dermal exposure to contaminated groundwater apply to this model?

DOE Response: Specifics regarding the PATHRAE modeling process used for the preliminary analytical WAC modeling were discussed with Ohio EPA subject matter experts at the technical exchange meeting held August 16, 2011. It was agreed that the detail presented and discussed regarding the PATHRAE modeling performed for preliminary analytical WAC in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that no changes are required to Appendix C.

67) Attachment, Method of Risk and Dose Assessment, page C-53: Hazardous Constituents – Risk and Dose. The equation presented for the calculation of the Peak Creek Risk shows that a slope factor is applied to the intake to determine the risk. However, there is no corresponding equation shown for how the Rd. is applied to the intake or dose for determining the hazard associated with noncarinogens. Revise this section of the text accordingly.

DOE Response: Text has been revised to include the equation for calculating the hazard quotient for non-carcinogens using the effective uptake variable and the corresponding reference dose.

68) Attachment, Table 6, page C-55:

a. The following toxicity values presented in Table 6 are inaccurate:

i. Arsenic reference dose: A reference dose of 5.24E-05 mg/kg-day is presented. A reference dose of 3.0E-04 mg/kg-day from IRIS should be used. Revise this table and calculations accordingly.

ii. Barium reference dose: A reference dose of 9.25E-04 mg/kg-day is presented. A reference dose of 2.0E-01 mg/kg-day from IRIS should be used. Revise this table and calculations accordingly.

iii. Chloroform slope factor: A slope factor of 6.10E-03 $(mg/kg\text{-}day)^{-1}$ is presented. A slope factor of 3.1E-02 $(mg/kg\text{-}day)^{-1}$ from IRIS should be used. Revise this table and calculations accordingly.

iv. Chromium III reference dose: A reference dose of 1.0E+00 mg/kg-day is presented. A reference dose of 1.5E+00 mg/kg-day from IRIS should be used. Revise this table and

calculations accordingly. Also, why wasn't Chromium VI considered for the development of the WAC?

v. N-nitro-N-propyl: Ohio EPA could not verify the slope factor presented in this table for this constituent. US DOE should display the complete name of all constituents in the table. Also, a column should be added to display the CAS number for each constituent since there are often many synonyms for constituents. Revise the table accordingly.

vi. Aroclor 1232: Ohio EPA could not verify the reference dose presented for Aroclor 1232. Ohio EPA is not aware of an Aroclor specific reference dose available for Aroclor 1232. The only Aroclor with a reference dose available is Aroclor 1254. Also, why isn't a slope factor presented for Aroclor 1232? PCBs are persistent, bioaccumulative, and toxic, and they are classified as a probable human carcinogen. Furthermore, there is an appropriate slope factor for highly persistent PCBs, such as Aroclor 1232, available from IRIS. Revise Table 6 and the WAC model calculations accordingly.

vii. This table does not include any reference concentrations or inhalation unit risk factors. Why? Revise Table 6 to display all applicable toxicity values as necessary.

viii. Table 6 should display the sources of the toxicity values presented. Revise the table accordingly.

ix. Toxicity values are inconsistently displayed in Table 6. For some constituents, the reference dose and/or slope factor is displayed as 0.00E+00 if there is not an appropriate, applicable toxicity value available. Other times the cell is left blank. Revise the table to consistently display toxicity values.

DOE Response: DOE concurs that some slope factors and reference doses used in the preliminary analytical WAC calculations are dated. As discussed in the technical exchange meeting held August 16, 2011, the most up-to-date slope factors and reference doses from relevant databases will be used in the draft analytical WAC developed during the Waste Disposition Evaluation process.

69) Attachment, Table 6, page C-55: Why is a peak effective dose not presented for Trichloroethylene?

DOE Response: The table has been revised accordingly to include the peak effective dose for trichloroethylene.

70) Attachment, page C-58 through page C-64: Only input/output files for the PATHRAE model are included in the attachment. Input/out files for all models used for the development of the preliminary analytic WAC should be included in the attachment. Revise the attachment accordingly.

DOE Response: Model input and output files for the preliminary analytical WAC modeling were provided to Ohio EPA subject matter experts at the technical exchange meeting held August 16, 2011. Detail presented and discussed regarding the assumption for bulk density adequately addressed this comment. Further, it was agreed that no changes are required to Appendix C.

71) Attachment, Table 4, page C-49: How were the K_d values presented in this table selected for use? If they were obtained from literature or US EPA or Ohio EPA guidance documents, provide a

reference for the sources of these values. If they were estimated from soil organic carbon/water partition coefficients (K_{oc}) and a fraction of organic carbon (f_{oc}), then the K_{oc} and f_{oc} values used to estimate the K_d values in Table 4 should be presented and the source of the K_{oc} and f_{oc} values should be referenced. Ohio EPA recommends obtaining K_d values for inorganics from the Regional Screening Levels (RSLs) User's Guide. The RSLs User's Guide can be found at the following website: http://www.epa.gov/reg3hwmd/risk/human/rb-concentrationtable/usersguide.htm.

For organic constituents, Ohio EPA recommends calculating a K_d from K_{oc} values and an f_{oc}.K_{oc} values should be obtained from the Chemical Specific Parameter RSL Table. The Chemical Specific Parameter RSL Table can be found at the following website: http://www.epa.gov/region09/superfund/prg/index.html. A default f_{oc} of 0.002 should be used.

DOE Response: Source documents have been added to Table 4 as requested.

72) No values for conductivity of the various bedrock layers are given. Given the critical nature of that variable, values should have been included. Likewise, Ohio EPA has no information on the nature and extent of fracturing in the bedrock.

DOE Response: Specifics regarding the preliminary analytical WAC modeling were discussed with Ohio EPA subject matter experts at the technical exchange meeting held August 16, 2011. It was agreed that the detail presented and discussed regarding the modeling performed in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that no changes are required to Appendix C.

73) The estimate of 105 ft of separation between the bottom of the cell liner for Area C and the water table seems too high. Since the well will straddle the top of the ridge, its eastern and western boundaries will be at lower elevations than the peak of the ridge, making a separation of 105 unlikely.

DOE Response: The estimated depth to groundwater from the bottom of the conceptual facility used in the preliminary analytical WAC calculations is reasonable given the level of detail currently available for Study Area C. It was agreed during the technical exchange meeting held August 16, 2011 that the draft analytical WAC developed during the Waste Disposition Evaluation process will consider detailed OSDC design and site-specific information for the modeled site(s), including depth to water. Further, it was agreed that no changes are required to Appendix C

74) No values are given for the water table gradient moving eastward from the cell in Area C. Gradient is also a critical component of contaminant transport predictions.

DOE Response: It was agreed during the technical exchange meeting held August 16, 2011 that the draft analytical WAC developed during the Waste Disposition Evaluation process will consider detailed OSDC design and site-specific information for the modeled site(s), including water table gradient. Further, it was agreed that no changes are required to Appendix C.

75) Recharge values for areas outside of the cell are not given. In short, the key variables for ground-water contaminant transport modeling have not been presented. Thus, Ohio EPA cannot evaluate the reliability of these models. Ohio EPA needs detailed reports for inputs and outputs of all of the models used for these predictions.

DOE Response: It was agreed during the technical exchange meeting held August 16, 2011 that the draft analytical WAC developed during the Waste Disposition Evaluation process will consider detailed OSDC design and site-specific information for the modeled site(s), including recharge values in the study area(s) modeled. Further, it was agreed that no changes are required to Appendix C.

76) Ohio EPA policy "Geotechnical and Stability Analyses for Ohio Waste Containment Facilities" (GeoRG Manual), available at: http://epa.ohio.gov/portals/34/document/guidance/gd_660.pdf, is applicable to all waste containment facilities in Ohio and should be used as a "to-be-considered" (TBC) guidance. Below Ohio EPA has listed the requirements and citations that should be listed in Table B.1 as a prerequisite for the construction of a RCRA hazardous waste landfill.

Requirements	**Citation**
The facility shall be designed to have a factor of safety greater than 1.00 when considering failures due to liquefaction.	GeoRG manual chapter 5
The facility shall be designed to maintain the slope of the bottom liner at 1%* or more after accounting for one hundred percent of the primary consolidation settlement and 100 years of secondary consolidation settlement of the compressible materials beneath the facility.	GeoRG manual chapter 6
The facility shall be designed to have a factor of safety greater than 1.50** when considering failures due to static slope stability.	GeoRG manual chapters 8 and 9
The facility shall be designed to have a factor of safety greater than 1.00** when considering failures due to seismic slope stability.	GeoRG manual chapters 8 and 9
The facility shall be designed to have a factor of safety greater than 1.10** when considering failures due to shallow saturated slope stability of the cap system and the leachate collection system.	GeoRG manual chapter 9

*A 2% slope is the minimum required at a solid waste facility after accounting for one hundred percent of the primary consolidation settlement and 100 years of secondary consolidation settlement of the compressible materials beneath the facility. 1% slope lakes conservatism and a factor of safety may be applicable to the settlement calculations.

**Higher factors of safety may be warranted depending on the quality of geotechnical data and risk to human health and environment; these values will need to be discussed during the development of this work plan.

DOE Response: Guidance documents and policy statements are not referenced as TBCs under the definitions provided in the DFF&O and in CERCLA. This policy will be reviewed and used in development of the landfill design, but will not be listed on the ARARs table.

77) The list of ARARs and TBCs do not cover operation protocols to insure proper facility management and maintenance, such as daily inspections for ponding water, erosion leachate out breaks and annual or a more frequent basis of surveying to insure filling is within design contours. The solid waste regulation may be appropriate ARARs or TBCs for these operational protocols OAC 3745-27-19(E)(10) and OAC 3745-27-19(M)(1).

DOE Response: The ARARs/TBCs do include requirements for facility management and regular maintenance and inspection of leachate systems, liners, and covers. See the following: "Run-on/run-off control systems;" "Post-construction monitoring of liners, leak detection, runon/runoff systems during the active life of the facility;" "Response actions for RCRA leachate detection systems;" "Facility and equipment inspection, testing and maintenance;" "Environmental monitoring at a LLW disposal system;" and "Monitoring of

liners and cover systems during and after construction and installation." No additional operational ARARs were added.

78) The information presented in Attachment C for development of preliminary analytical waste acceptance criteria (WAC) for a potential on-site disposal cell (OSDC) is insufficient for review. US DOE should submit electronic copies of the input and output files from the programs used to perform the calculations and the standard output files for the various programs, along with the detailed justification for the input parameters.

DOE Response: Model input and output files for the preliminary analytical WAC modeling were provided to Ohio EPA subject matter experts at the technical exchange meeting held August 16, 2011. It was agreed that detail presented and discussed regarding the modeling performed for preliminary analytical WAC in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that no changes are required to Appendix C.

79) Ohio EPA has the following comments on the HELP model calculations; additional comments may be made after a full submittal:

a. The drainage length for layer 4, the cap drainage layer, is listed as 100 ft at a 5% slope. This flow path length seems unlikely since that short of a drainage length would require extensive piping and outlet structures. For example, at Fernald measuring from the apex of the facility, there is ≈ 100 ft of flow path at a 5% slope, which feeds into a 10 to 1 slope that is ≈50 ft long that feeds into a 6 to 1 slope that is ≈450 ft long; there are no pipes or outlets on this slope except at the very toe. HELP was not designed to analyze multiple slopes all draining into one another. However, if one examines an average slope at Fernald and the total slope length and considers the geomembrane completely compromised, then the average annual flow out of Fernald would be approximately 0.45256 in. (see attached HELP output.)

b. Layer 5 "Clay/GCL liner" appears to represent the 0.25-in.-thick GCL and some of the 36-in.-thick clay layer, yet layer 6 "clay" is 36 in. thick. Ohio EPA ran the HELP with layer 5 at 0.25 in. thick. The flow out of the bottom of the facility only changed by 0.05885 average inches per year. When this change and a similar change was made to layer 12 "clay/GCL liner", the flow out of the bottom of the facility only changed by 0.06698 average inches per year from the original.

c. The hydraulic conductivity of a GCL is very sensitive to leachate containing cations since GCL are primarily made from sodium – bentonite, which easily exchanges with other cations such as K^+, Rb^+, Cs^+, Mg^{2+}, Ca^{2+}, Ba^{2+}, Cu^{2+}, Al^{3+}, and Fe^{3+}, all of which may be present in the leachate. The estimated hydraulic conductivity of the GCL should be adjusted to reflect the likely concentrations of cations in the leachate using the equation proposed in "Hydraulic Conductivity and Swell of Nonprehydrated Geosynthetic Clay Liners Permeated with Multispecies Inorganic Solutions" Kolstad et al available at: http://cedb.asce.org/cqi/WWWdisplay.cgi?144012.

d. The hydraulic conductivity of the waste was set as similar to a lean silt, considering the amount of rubble going into this facility. This may not be accurate. US DOE needs to provide a justification for this assumption.

e. The leachate collection system piping network is not included in the HELP model input. US DOE should explain why, when and how they plan to seal the leachate extraction system.

f. There is a missing drainage layer under layer 12; US DOE should provide justification for the missing drainage layer.

g. The amount of evapotranspiration 22.539 in. appears low for a facility with such a thick layer of highly permeable material (6 in. of granular filter, 36 in. of biointrusion barrier, and 12 in. of drainage layer). It would appear that the evaporation zone depth, which tends to control the quantity of evapotranspiration, would be nearly the thickness of the topsoil plus the vegetative layer, since the highly permeable material below the vegetative layer would tend to dry out the vegetative layer causing root depth to be deeper. US DOE should provide justification for the evaporation zone depth used in this model.

DOE Response: Specifics regarding the preliminary analytical WAC modeling were discussed with Ohio EPA subject matter experts at the technical exchange meeting held August 16, 2011. It was agreed that the detail presented and discussed regarding the preliminary analytical WAC modeling performed in the Waste Disposition RI/FS Work Plan adequately addressed this comment. Further, it was agreed that the draft analytical WAC developed during the Waste Disposition Evaluation process will consider detailed OSDC design and site-specific information for the modeled site(s). It was also agreed that no changes are required to Appendix C.